IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication AUGUST 11, 1960

George Kufrin

★ **Machine Tool Exposition Feature:**

What's Coming Up In New Tool Designs? p. 193

What Tool Users Plan to Buy p. 181

Tool Steel, Carbide Directory p. 267

Digest of the Week p. 2-3

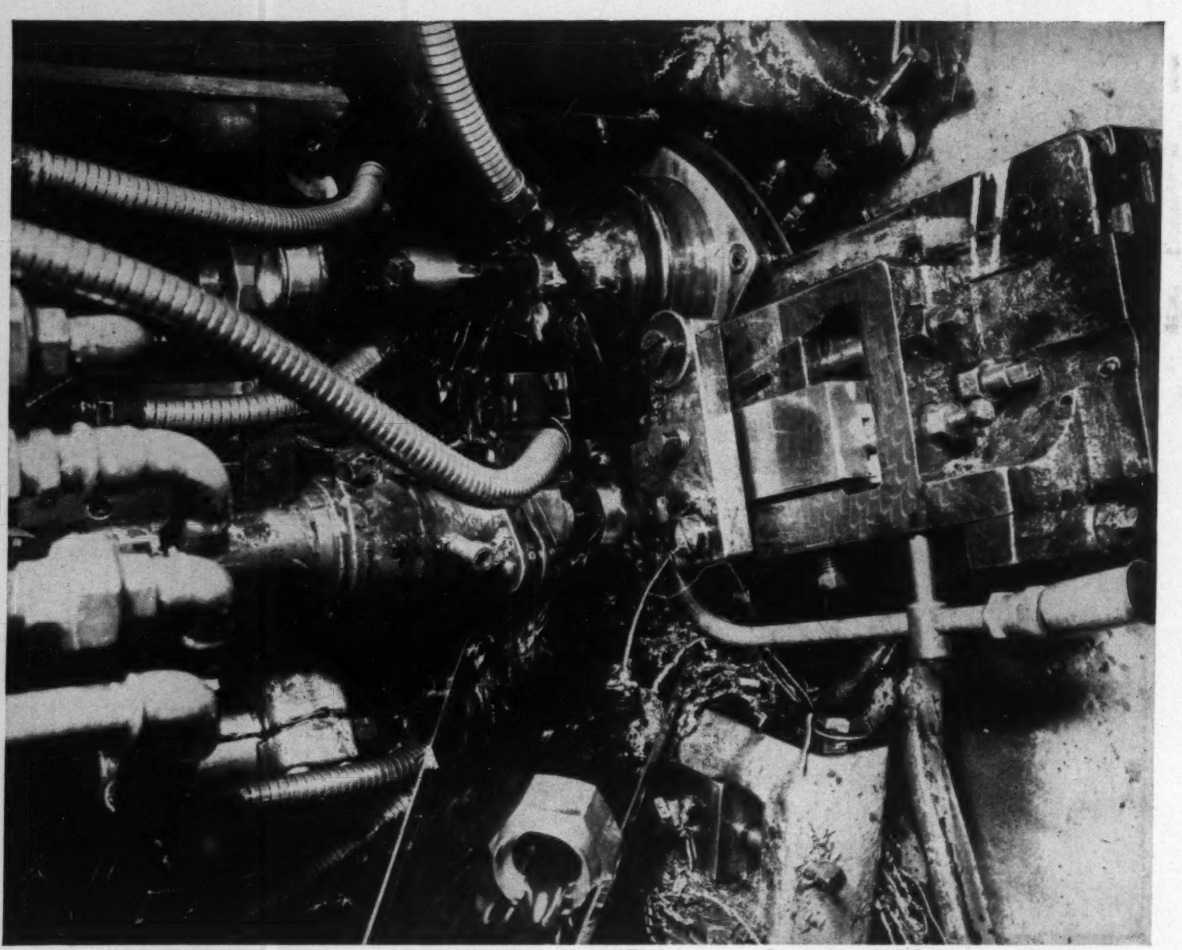


Photo courtesy Elastic Stop Nut Corporation of America

Nuts . . . ESNA makes millions of them from Aristoloy Electric Furnace Steel

Steel for self-locking hex nuts must be uniform in structure, easy to machine and free from internal and external defects. Elastic Stop Nut Corporation of America insists on these qualities . . . and gets them with Aristoloy cold finished bars.

Aristoloy Electric Furnace Steels, carefully controlled from melt shop to finishing operations, meet specifications for this and other applications requiring steel of uniform quality.

For complete information about Aristoloy blooms, slabs, billets and bars, in carbon, alloy, stainless and leaded, call the Copperweld representative in your nearest large city . . . or write for NEW PRODUCTS & FACILITIES CATALOG.

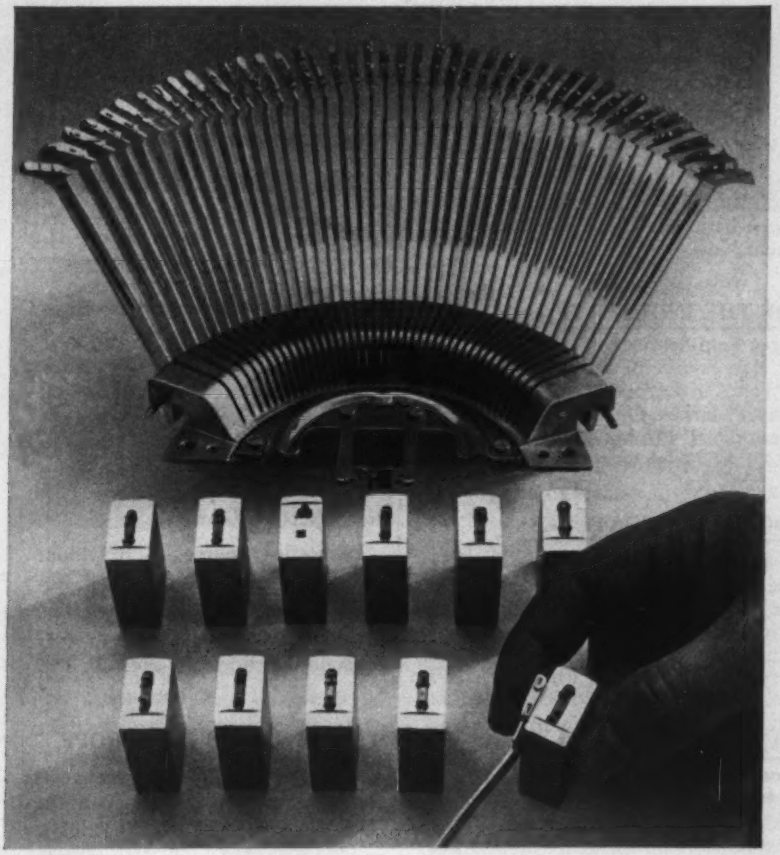
ARISTOLOY STEELS

DIVISION OF
COPPERWELD STEEL COMPANY

ARISTOLOY STEEL DIVISION • 4001 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation



IBM makes 200 per cent more type slugs per matrix with Bearcat Tool Steel

Talk about enthusiasm! At the Lexington, Ky., plant of International Business Machines Corp. they have good reason to sing the praises of Bearcat tool steel. Recently, production of type slugs per matrix was improved 200 per cent by changing to a die made of Bearcat. The die "kneads" raised letters of the alphabet into steel slugs.

Bearcat is best known for its remarkable shock-resistance. In this instance, the manufacturer also reported better resistance to wear, and easier machinability (as compared with the tool steel formerly used).

Bearcat is our super grade of shock-resistant air-hardening tool steel. It's ready and willing to handle the toughest shock applications. Because it's an air-hardening steel, Bearcat minimizes both quenching hazards and distortion in heat-treatment.

Like to try Bearcat? Telephone your Bethlehem tool steel distributor.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

TOOLS can be repaired by welding if the proper procedure is used

To incorporate design changes or repair, all tools and dies made of tool steel can be welded successfully if the following procedure is observed:

1. Full-anneal the tools. Good atmosphere control is necessary to avoid scaling and decarburization of the working surfaces.
2. Prepare the crack for welding by "veeing" its full depth and length. Magnetic particle inspection is advisable.
3. Use a welding rod which will deposit steel of the same composition as the tool.
4. Preheat to 400 F - 800 F, and maintain this temperature during welding.
5. Clean the slag from each bead before proceeding with the next bead.
6. Immediately after welding, transfer the tool into a warm furnace (400 F min) and full-anneal.
7. Machine or grind the weld to the desired tool dimensions.
8. Heat-treat the tool by quenching and tempering to the desired hardness, using the standard procedure for the grade involved.
9. Grind the tool working surfaces. The depth of metal removal will depend upon the amount of decarburization produced in Steps 1, 6, and 8.

The use of this procedure will permit the successful welding of tools if it is essential that welding be done. In the majority of instances, however, it will be found both cheaper and quicker to make up new tools.

When emergency welding is done on a production line, it is often necessary to eliminate many of the steps mentioned above, thereby reducing the chances of producing successful welds.

THE IRON AGE
Chestnut and 56th Sts.
Philadelphia 39, Pa., SH 8-2000

GEORGE T. HOOK, Publisher

EDITORIAL STAFF
TOM C. CAMPBELL, Editor-in-Chief
GEORGE F. SULLIVAN, Editor
E. C. BEAUDET, Managing Editor

News Editor	R. D. Raddant
Technical Editor	J. J. Obrzut
Asst. News Editor	H. R. Neal
Machinery Editor	R. H. Eshelman
Metallurgical Editor	C. L. Kobrin
Welding Editor	R. R. Irving
Nonferrous Editor—N.Y.	F. J. Starin
Art Director	T. S. Paaby

Associate Editors: P. J. Cathey, W. N. Redstreake, J. D. Baxter, R. J. Radomski, M. J. Tatich, B. F. Surer. Assistant Editor: G. C. Sekula. Regional Editors: K. W. Bennett, Chicago; T. M. Rohan, Cleveland; A. E. Fleming, Detroit; R. R. Kay, Los Angeles; G. J. McManus, Pittsburgh; G. H. Baker, R. W. Crosby, Washington. Correspondents: F. L. Allen, Birmingham; N. Levenson, Boston; R. E. Koebbe, St. Louis; J. Miller, San Francisco; R. Kazarian, Buffalo; D. R. Coughlin, Seattle; A. T. Collins, Houston; F. Sanderson, Toronto; F. H. Harley, London, England. Chilton Editorial Board; Paul Wooton, Washington representative.
Robt. Gunning—Readability Consultant

WASHINGTON EDITORIAL OFFICE
Washington 4....National Press Bldg.

BUSINESS STAFF

Marketing Manager	R. H. Groves
Circulation Manager	W. M. Coffey
Production Manager	Warren Owens
Promotion Manager	R. A. Wilt
Mkt. Research Manager	G. V. Shanno
Census Manager	William Laimbeer
Research Consultant	Oliver Johnson

REGIONAL BUSINESS MANAGERS
**Denotes editorial office also*

Atlanta 3...............J. W. Sangston
32 Peachtree St., N. E. Jackson 3-6791

**Chicago 1..T. H. Barry, W. R. Pankow*
360 N. Michigan Ave. Randolph 6-2166

**Cleveland 15, R.W.Watts, R. L. White*
930 B. F. Keith Bldg. Superior 1-2860

Columbus 15, Ohio...Harry G. Mumm
LeVeque-Lincoln Tower Capital 1-3764

Dallas 6 ....W. J. Smyth
189 Meadows Bldg. EMerson 8-4751

**Detroit 2...............W. J. Mulder*
103 Pallister Ave. Trinity 1-3120

**Los Angeles..........R. Raymond Kay*
1920 Strand
Manhattan Beach Faculty 1-5306

**New York 17...C. T. Post, I. E. Hand*
100 E. 42nd St. Oxford 7-3400

**Philadelphia 39—*
B. L. Herman, J. A. Crites, W. E. Carr
Chestnut & 56th Sts. Sherwood 8-2000

**Pittsburgh 19.............T. M. Fallon*
1707 Frick Annex Bldg. Atlantic 1-1830

San Francisco 3..............Don May
1355 Market St. UNderhill 1-9737

W. Hartford 7...........Paul Bachman
62 LaSalle Rd. Adams 2-0486

England ....Harry Becker
15 Gratton St., Altrincham, Cheshire
J. H. Kofron....Chilton Research Dir.

A Chilton Publication
CHILTON OFFICERS & DIRECTORS
G. C. Buzby, President

Vice-presidents: P. M. Fahrendorf, L. V. Rowlands, G. T. Hook, R. E. McKenna; Treasurer: W. H. Vallar; Directors: M. E. Cox, F. P. Tighe, E. B. Terhune, Jr., R. W. Case, Jr., C. A. S. Heinle, J. H. Kofron, G. E. Cameron. Comptroller, Stanley Appleby. *Indexed in Applied Science & Technology Index and Engineering Index.*

BPA NBP

Copyright 1960 by Chilton Company

THE IRON AGE, published every Thursday by CHILTON COMPANY, Chestnut & 56th Sts., Philadelphia 39, Pa. Second class postage paid at Philadelphia, Pa. Price to the metalworking industries only or to people actively engaged therein, $5 for 1 year. $8 for 2 years in the United States, its territories and Canada. All others $15 for 1 year; other Western Hemisphere countries, $25; other Foreign Countries, $35 per year. Single Copies 50¢. Annual Review Issue $2.00. Cable: "Chilton," Philadelphia

The **IRON AGE**

August 11, 1960—Vol. 186, No. 6

Digest of the Week in

★Starred items are digested at right.

EDITORIAL

Thinking Americans: There Are More of Them Now 7

NEWS OF THE INDUSTRY

★Commerce Feld Services 149
★Utah Is New Source of Beryl Ore ... 151
★Wages, Taxes in Europe 152
★New Diesel Markets Opening 155
Bethlehem Steel Promotions 156
The IRON AGE Salutes 159

1960 TOOL SHOW FEATURES

Tool Users' Buying Plans 181
★Machine Tools 1960 193
Machine Tool Show Previews 209
Production Engineering Show 237
Coliseum Machine Show Previews ... 259
Directory of Tool Steels, Carbides ... 267

NEWS ANALYSIS

Newsfront 9
Report to Management 161
★Automotive 163
★Washington 166
★West Coast 168
★Machine Tools 170

MARKET AND PRICE TRENDS

Market Planning Digest 147
★The IRON AGE Summary 327
★Purchasing 328
Iron and Steel Scrap Markets 332
Nonferrous Markets 336

REGULAR DEPARTMENTS

Fatigue Cracks 11
Letters From Readers 13
Industrial Briefs 172
Men in Metalworking 175
Free Literature 213
Clearing House 344

INDEX TO ADVERTISERS 349

News of the Industry

COMMERCE FIELD OFFICES

Ready for More Service—Business often neglects the nearby services of the Dept. of Commerce field offices. Here's a rundown on the effective—and profitable—ways they can help. P. 149

BERYL ORE GAIN

Domestic Source — Beryllium producers plan to exploit large deposits of beryl ore found in Utah. This will give the industry its first big source of domestic ore. P. 151

WAGES, TAXES IN EUROPE

How They Compare—Wage costs are lower in W. Europe than the U. S. So are taxes. But the difference in wages is less than commonly suspected. And tax comparisons are hard to make. P. 152

SMALL ENGINES

They're Revolutionary—American Marc, Inc., is revolutionizing the diesel engine industry with marine outboard engines. The company sees a future market with sales hitting nearly $400 million. P. 155

AUTOMOTIVE

Smaller Cars and Profits—The second quarter was the first chance Big Three automakers got to mea-

Metalworking

Cover Feature

NEW MACHINE TOOLS—Growing markets, space-age demands and world-wide competition have moved machine tool design swiftly ahead in the past five years. Modern design highlights the 1960 Machine Tool Exposition. P. 193

sure the impact of compact cars on profits. Unit sales were up, but profits didn't keep pace. P. 163

MACHINE TOOL

Machining Data—A new research program aims at cutting both time and expense involved in determining machining characteristics of new materials. P. 170

Engineering-Production Developments

DRILLING AND BORING

With Numerical Controls—Tape-controlled turret drills are moving into new production fields. Both job shops and large plants report cost savings. Complete programming reduces operator fatigue—and much of the human error. Dial-in control serves the middle ground between manual machining and complete automation. P. 194

TURNING EQUIPMENT

Less Operator Effort — Design, focused on more operator convenience, means a drop in part floor-to-floor time. Tracer attachments have undergone steady improvements. Some can produce contours on work that's held in a chuck or attached to a face plate. P. 196

MILLING MACHINES

Versatility Grows—Big news in milling is the advance of control sophistication. Tape-controlled units mill contours that used to be considered impossible. Automatic tool changing is a natural partner to tape controls. Remote controls also look good. P. 198

GRINDING AND HONING

Steady Progress — Production rates are on the rise. Look for above- and below-line centerless grinding. Horizontal stack honing shows promise. New flexible grinding machines can break many production bottlenecks. P. 200

BROACHING AND SHAPING

Advanced Designs — Chain broaching is on the rise. Horizontal surface broaching is also shooting the works. A 24-in. hydraulic shaper has a fully automatic cycle controller that regulates loading and unloading operations. P. 202

Market and Price Trends

WASHINGTON

Big Bills—Big spending bills have a good chance of getting congressional approval soon, even if the Administration opposes them. Election year pressures and the desire of the candidates to get the bills passed should get them through. P. 166

WEST COAST

State of Growth—Hawaii is presently enjoying a business and growth boom. But with this comes problems and planning for the future. The boom will continue but will soon start tapering off. P. 168

STEEL SUMMARY

Market Developments — Outwardly, there is little change in the steel market. But a series of minor developments indicates some changes are coming. As it stands now, October looks like the best month of the second half of the year. P. 327

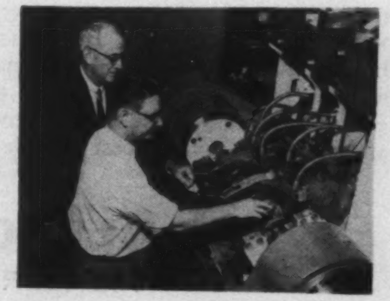
PURCHASING

Supply and Demand — The change from tight supplies to plentiful supplies has meant that certain adjustments had to be made. United Engineering & Foundry Co. has employed a system of checks and balances and discovered that it works. P. 328

NEXT WEEK

PACKAGE TOOLING

Speeds Crankshaft Machining—A complete tooling package creates a hybrid lathe. Developed for critical crankshaft turning, the design principle has wide potential use. The hybrid lathe serves as a general purpose and special machine.



A-L ANSWERS YOUR QUESTIONS ON VACUUM MELTED STEELS AND ALLOYS

Q. Where are vacuum melted alloys best suited?

A. For exacting applications—including materials for rockets, missiles, and jet engines. And other places where expensive machined parts are involved. In highly stressed parts where failure is highly costly. Where increased reliability is vital.

Q. What are the advantages of A-L vacuum melted alloys?

A. You get parts with optimum quality for critical applications—higher mechanical properties, better fatigue strength, improved toughness, and better transverse ductility. You also get maximum insurance against internal defects through improved cleanliness and decreased gas content. And hot and cold workability are improved, the material is more homogeneous, and properties are better.

Q. How are these metals made?

A. A-L uses all three of the vacuum melting processes. Consumable electrode vacuum arc remelting is used to produce A-L Consutrode® steels and alloys in ingots up to 20,000 pounds in weight. Induction vacuum melting is used to produce 2,000 pound heats of Allegheny Ludlum Invac materials. And remelting Invac electrode stock by the consumable electrode process produces A-L Invacutrode steels and alloys that have the best possible combination of chemistry control, cleanliness, and homogeneity.

Q. Specifically, what metals are available in A-L's premium quality melting?

A. Most of the steels and special alloys—low alloy steels, bearing steels, stainless steels, tool and die steels, and high temperature steels and alloys.

Q. In what forms are these A-L special steels available?

A. In all commercial mill forms—plates, sheet, strip, billet, bar, wire, tubes, and even extrusions.

Q. How do these vacuum melted alloys compare in cost with ordinary alloys?

A. Naturally vacuum melting costs more. Consutrode alloys are the least expensive, followed by Invac alloys and Invacutrode alloys. Their use is economically justified by the improvement of quality in the finished part, the quality required by the severity of the manufacturing process involved, and the increase in the yield of sound parts.

Q. Where can I get more information?

A. Ask your A-L representative for your copy of "Modern Melting at Allegheny Ludlum." It gives technical data on the new melting techniques and quality improvements in materials. Or write: *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania. Address Dept. A-8-1.*

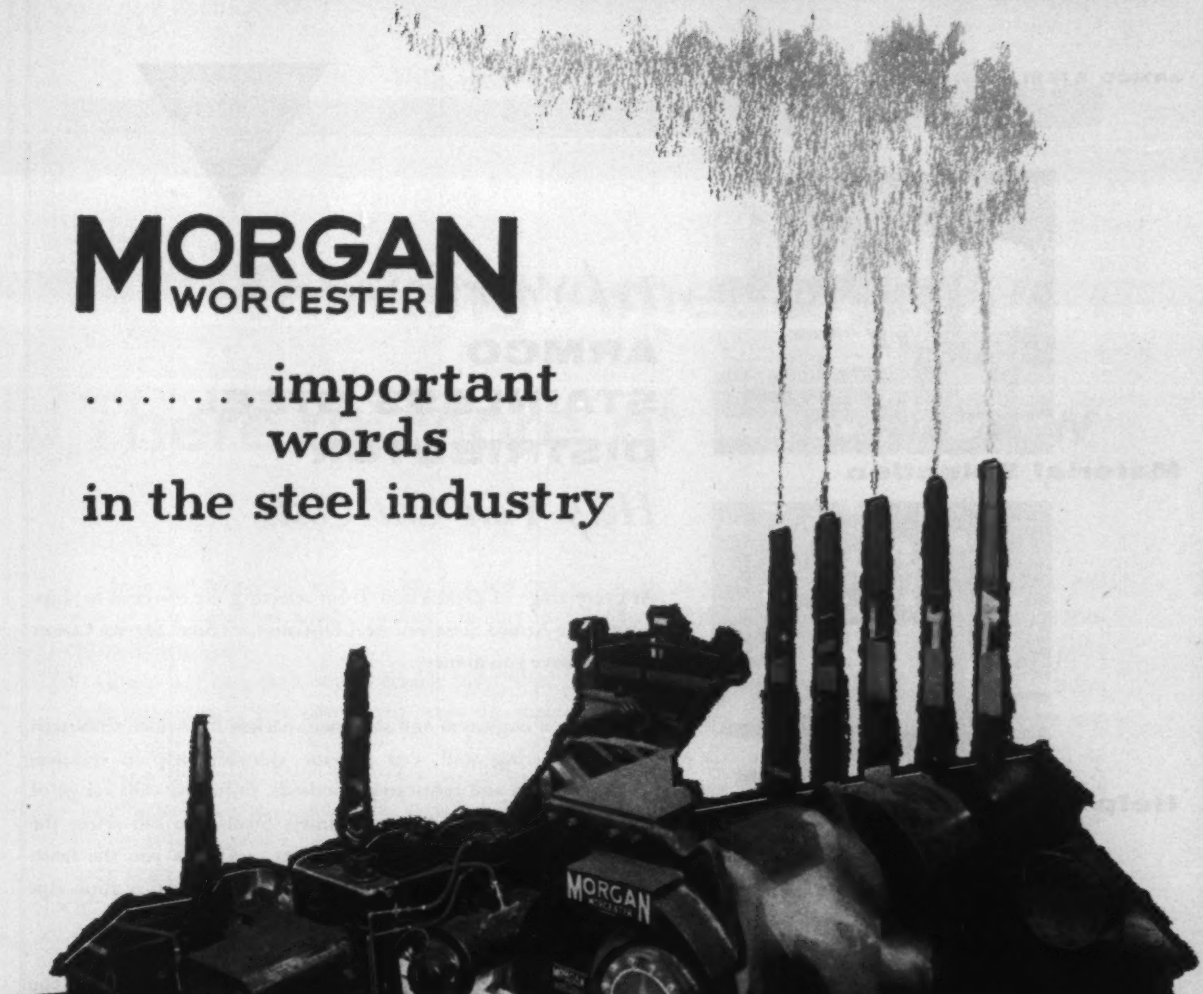
ALLEGHENY LUDLUM A-L®

PIONEERING on the Horizons of Steel

2256

MORGAN WORCESTER

.... important words in the steel industry



. . . important because MORGAN stands for creative engineering nurtured by 70 years of acquiring experience in the rolling mill field. MORGAN developed the first continuous rolling mill in the United States—and has consistently maintained pre-eminence in this field. The true test of MORGAN quality and performance is shown in the number of new mills ordered by old customers.

Write for our new booklet which shows, in greater detail, the range of MORGAN mills.

MORGAN WORCESTER

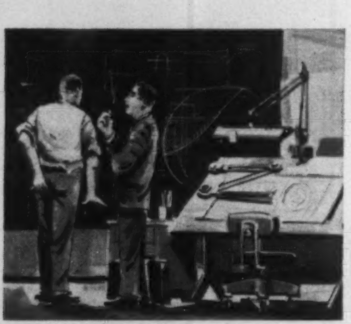
MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

ROLLING MILLS • MORGOIL BEARINGS • GAS PRODUCERS
WIRE MILLS • EJECTORS • REGENERATIVE FURNACE CONTROL

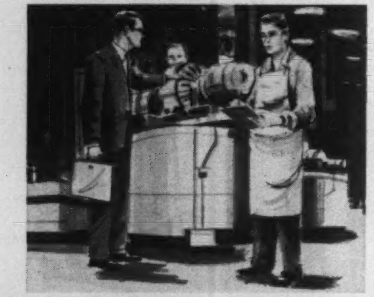
RM-76

ARMCO STEELS / for better products—lower costs

New steels are born at Armco



Material Selection



Help in Fabrication

Complete Local Stocks

Fast Service

Let Your ARMCO STAINLESS STEEL DISTRIBUTOR *Help You Cut Costs*

At every stage of production, from selecting the material to shipping, your Armco Stainless Steel Distributor's Steel Service Center can help save you money.

Mill-trained engineers and salesmen, backed by Armco's research and engineering staff, can provide valuable help in stainless grade selection and fabrication methods. From the wide range of standard and special Armco Stainless Steels you can select the stainless that meets your requirements and costs you the least. Specialists with Armco Distributors can suggest fabrication tips that cut production time and costs.

Your Armco Distributor's extensive stocks of stainless give you a storage-free inventory. In addition, he has many supplementary services that can be integrated with your own manufacturing facilities to further cut costs.

Make most effective use of the many cost-cutting services of your Armco Distributor by knowing exactly *how* he can help you save money. Get in touch with him today. If you don't know him, write us for the name of the Armco Stainless Steel Distributor in your area. Armco Steel Corporation, 2250 Curtis St., Middletown, Ohio.

Stainless Steel

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

THE IRON AGE EDITORIAL

Thinking Americans: There're More of Them Now

There will be people who will not like the way this or that candidate wears his hair. It may influence their vote.

Others will cast their votes because they "like" their candidate. Still others will vote as their granddaddy did.

Many will cast their votes for some vague "intelligent" reason. Some will vote for this or that man because of a hidden compulsion carried over from a troubled childhood.

As long as we are humans instead of robots, we will have this state of affairs. But this year it looks as if more Americans will do considerable thinking before they make up their minds on the candidates.

In this piece we can forget about the dyed-in-the-wool Republicans or Democrats who vote the straight party line regardless of the candidate. We are considering those who appear to be defying the pollsters, the wiseacres and the pundits.

In the past, the majority of the voters had usually made up their minds before the candidates got very far off home base in the campaign. This year, the number of minds not made up as yet is considerable.

It may be that Vice President Nixon and Senator Kennedy are such a change from the past that the independents—and some of the party stalwarts—have been startled into new reactions.

We have no Presidential candidate who can produce the father-image. Nor do we have an outstanding hero or nationally loved "grand old man" of the people. Instead, we have two hard-boiled, efficient and knowledgeable young men.

They will attempt to woo the people with their personalities, their grasp of the people's problems and their admitted ability to cope with awesome problems of the nuclear age.

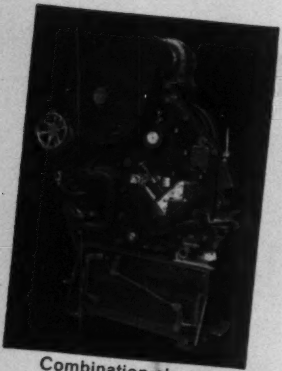
Regardless of why the people are slow to make up their minds this time, it is good for the country. It will be good for the candidates.

The people will have a chance to decide if they want more control from Washington or if they want to stop—for a while at least—the national march towards an "enlightened" socialism — a socialism which would further demean the individual for the benefit of the crowd.

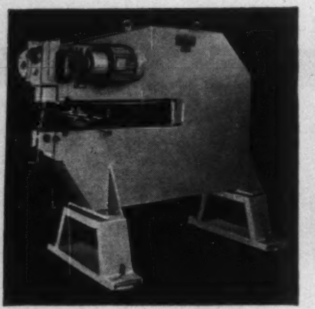
For the first time in many years—if not in history—a fair-sized number of citizens will think hard before they vote.

Tom Campbell

Editor-in-Chief

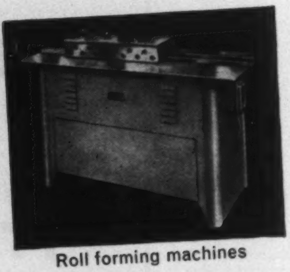


Combination shear, punch and coper

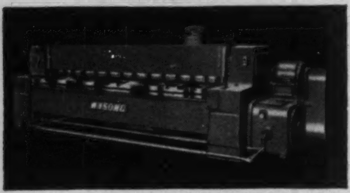


Shearing and forming machines

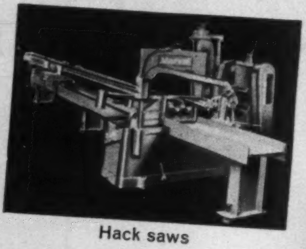
Arc welders



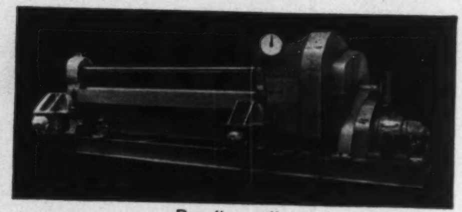
Roll forming machines



Power squaring shears

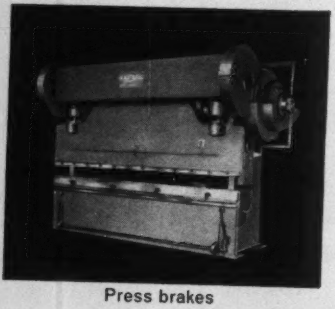


Hack saws

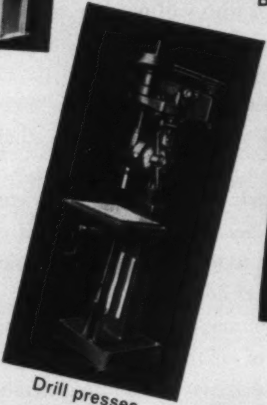


Bending rolls

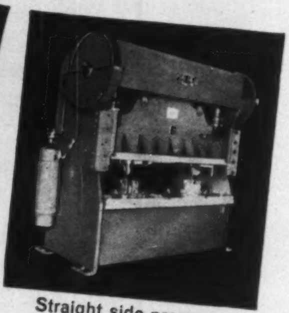
Hoists



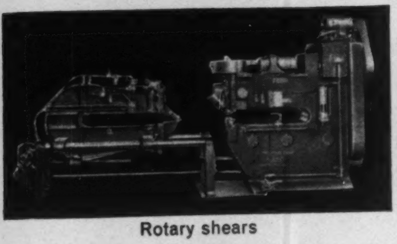
Press brakes



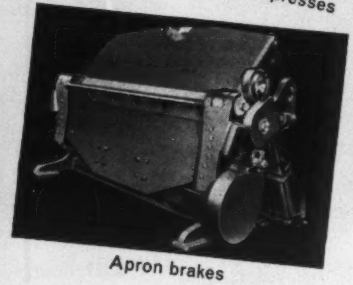
Drill presses



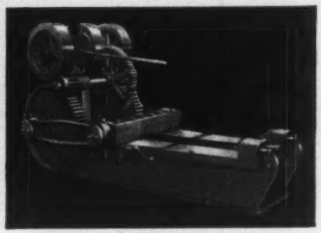
Straight side presses



Rotary shears



Apron brakes



Bulldozers

THE METALOGICS OF METALWORKING MACHINERY

375-ton rolls . . . 7½-lb. punches . . . everything in-between. Whatever you need in metalworking machinery, look to Ryerson. More than 3800 types and models are available—produced by almost 100 of the nation's top manufacturers.

And Ryerson offers unbiased recommendations based on the experience of 117 years' service to metal fabricators. You also get a double guarantee of satisfaction—ours and the manufacturers'. Consult your Ryerson machinery specialist, today.

METALOGICS

RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL®

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

Plastic Stops Vaporization

Sixteen pounds of plastic laminate replace 1000 lb of metal in a vital part of giant storage tanks for liquid oxygen. These tanks, weighing over 150 tons, are used to fuel guided missiles. The laminate—treated with melamine resin to impart maximum structural strength—fits between inner- and outer-tank compartments. It acts as an insulation barrier at temperatures as low as –320°F.

Cuts Assembly Time 20 pct

By using a new concept of aluminum extrusions, truck body assembly time is cut 20 pct. An entire body has been made of aluminum panels which snap-lock into each other tightly enough to eliminate welding or riveting of joints. The extrusions can be used in a series to make almost any type of continuous flat or curved surface.

Forms 200 Cans per Minute

A new horizontal press which draw-forms aluminum tumblers at the rate of 200 per minute is in the making. The can forming device is drawing much interest among brewers. Cans are drawn in a single press which can be located on line within the brewery.

Low-Temperature Alloys

Look for new steel alloys, designed primarily for cryogenic uses. Steelmakers are still smarting about unfavorable comparisons that have been made by suppliers of other materials. The mill is anxious to bring out the benefits of properly selected alloys in the low-temperature range.

Heat Strengthens Ceramic

Crystolon 63, developed by the Norton Co., is a nitride-bonded silicon-carbide refractory material. It shows promise as a low-cost structural ceramic. Heat strengthens the new refractory's nitride bond. Modulus of rupture at 1250°C is 7000 psi. At room temperature, this rupture value is 6400 psi. In addition, the newcomer has high thermal conductivity and good corrosion resistance.

Higher Physicals Announced

Increases in minimum guaranteed tensile and yield strengths for extruded aluminum shapes of alloy 7178-T6 were announced by Aluminum Co. of America. The increase applies to shapes up to ½ in. thick. Chief advantage of the increase is that aircraft and missile designers can now use the high-strength shapes without the penalty of increased weight.

Resists Heat Over 5500°F

Ingots containing 85-pct tungsten and 15 pct molybdenum are being made available in sizes up to 11-in. diam by Climax Molybdenum Co. The full density alloy will withstand temperatures over 5500°F. The ingots are supplied in the as-cast condition, machine turned and heat treated to relieve casting stresses. Some uses include nozzles for missiles, vanes and trajectory equipment.

Rare-Earth Metals

A wide range of research in the field of rare-earth metals has been scheduled by the U. S. Bureau of Mines. Future projects will include physical-processing methods, solvent extraction, ion exchange and other chemical methods of recovering rare-earth elements and yttrium from ores, concentrates, plant residues and wastes.

Plastic Bends With Steam

An improved method of bending plastic pipe is recommended by the Navy's Bureau of Ships. By placing the plastic pipe in a steam chest to make it pliable, time is cut from one hour, to five minutes. Formerly a live steam hose was used for the job. The tip can save both time and money in many industrial operations.

Held down "impossible" job for months vs. days

They were asking the "impossible" at this big West Coast mine. The hose used in their big beneficiation plant must be tough enough to handle the flow of murderously abrasive iron-ore slurry. Yet it still must be flexible enough to follow a twisting, bending course down from the top of the seven-story structure.

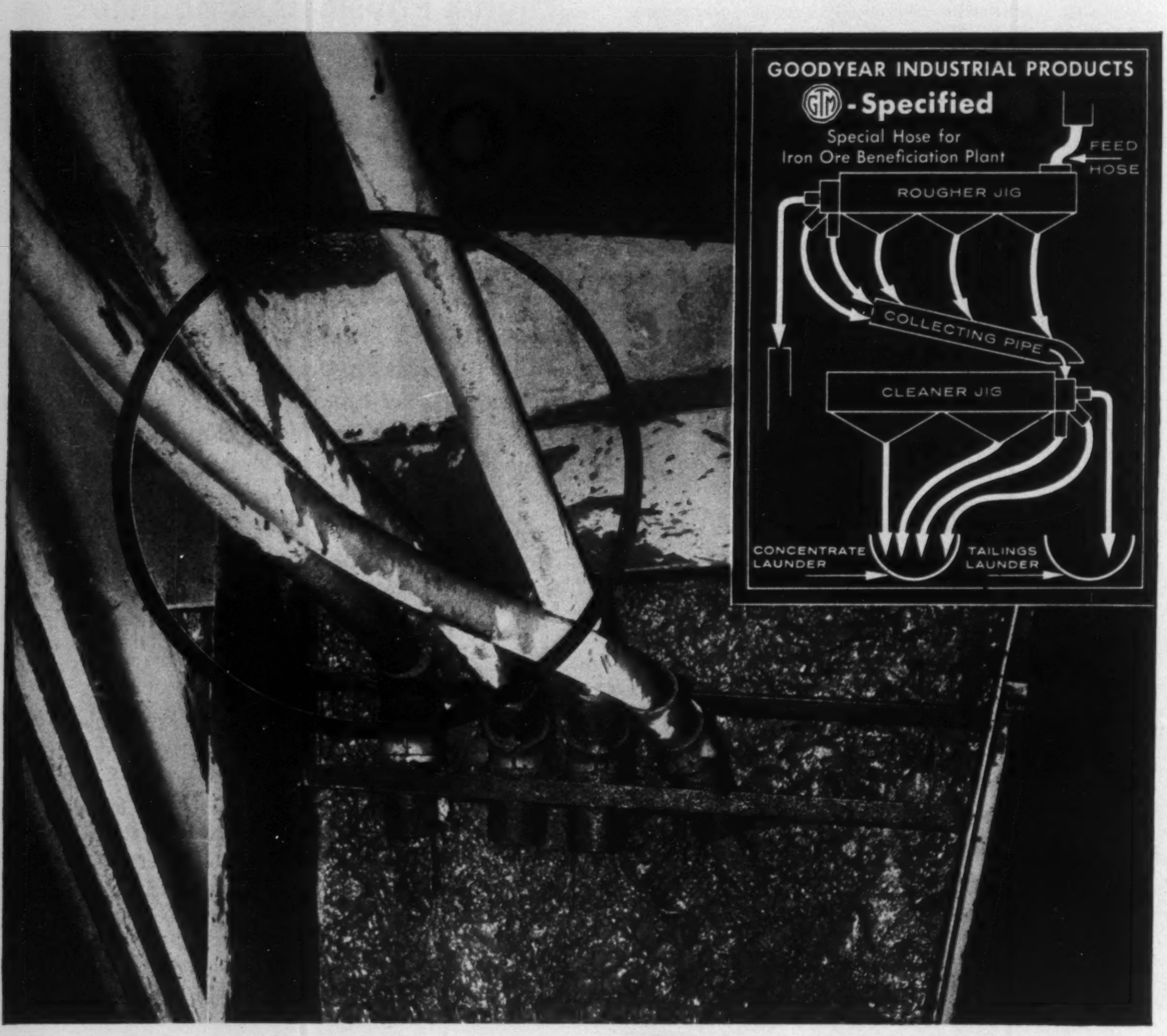
So it's little wonder their first hose sprang numerous leaks almost immediately—was finished completely in about 45 days. It wasn't until the G.T.M.—Goodyear Technical Man—recommended his special ore-carrying hose that they got satisfactory service.

In fact, the G.T.M.'s hose has been so successful that the company's purchased over 4,000 feet of it to date. It's been on the job over 12 months now—completely mastering this extra-tough job.

So once again, the G.T.M. has proved that the "impossible" often boils down to right hose—and the right recommendation. Make sure you get both—by contacting your Goodyear Distributor—or writing Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on V-Belts, Hose, Flat Belts and many other industrial rubber and non-rubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*


GOODYEAR INDUSTRIAL PRODUCTS
GTM - Specified
Special Hose for Iron Ore Beneficiation Plant
FEED HOSE
ROUGHER JIG
COLLECTING PIPE
CLEANER JIG
CONCENTRATE LAUNDER
TAILINGS LAUNDER

HOSE FOR ALL INDUSTRY BY

GOODYEAR

THE GREATEST NAME IN RUBBER

FATIGUE CRACKS

Top Coverage

The Machine Tool Exposition opens in Chicago next month. But this week The IRON AGE takes you there via exclusive pictures and advance information on what's going on and what you'll see in the International Amphitheater.

To get this exclusive lineup, Managing Editor Eugene C. Beaudet flew to Chicago from Philadelphia and Machine Tool Editor Ralph Eshelman went over from Detroit. There they joined Chicago Editor Keith Bennett.

Get It First — The three man team then headed for the Amphitheater to gather some of the material needed to turn out a top notch issue on the Exposition.

To get the pictures we called on Chicago photographer George Kufrin. He's a young, energetic man with a camera who scrambled about the huge machinery with the know-how of an experienced rigger.

Mr. Kufrin is only one of several nationally known photographers whose work you have seen in The IRON AGE. The list of other top photographers includes: Gene Pyle and Joe Clark, Detroit; Larry Williams, Philadelphia; Jim McHale, Cincinnati; Bob Purdy, Pittsburgh; and Lew Merrim, and Dave Eisendrath, New York.

Of the Essence—Timing in putting together this special issue was very important. When our editorial team arrived at the Amphitheater the huge press on this week's cover was just being erected. And it was done in only two hours. We got the picture.

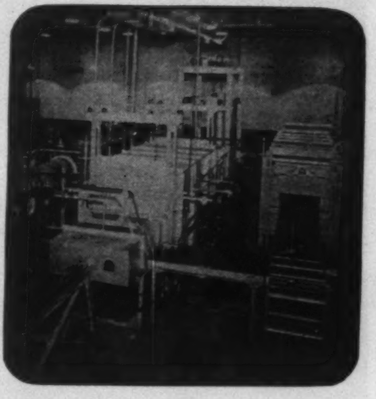
Big Story—This is only a small part of the effort put into this Special Issue. The big story for the readers is the advance information on technical developments at the show which is reported in Machine Tools 1960 on p. 193.

And for those of a marketing turn of mind, the survey of the buying plans of machine tool users appears on p. 181. Finally, to wrap up the Machine Tool Exposition Show Issue you'll find new product previews of the Exposition, Production Engineering Show and Coliseum Machinery Show. And another big plus is the new and revised Directory of Tool Steels and Carbides on p. 267.

HILL ACME
AUTOMATIC

ON THE JOB: IRON AGE editorial team inspects machine to be exhibited at the National Machine Tool Exposition. On the floor is Managing Editor Eugene Beaudet. Chicago Editor Keith Bennett is in the upper left. Next to him is Machine Tool Editor Ralph Eshelman.

LABOR SAVED 50%
PRODUCTION UP 50%



R-S . . .
CONTINUOUS HARDENING, QUENCHING, DEGREASING, DRAWING LINE

It's one operation instead of four to heat treat cylinder liners at Continental Motors with the R-S equipment. Electric heat treating line is one complete unit ...temperature is 1575° F. for hardening, it is oil quenched and the draw furnace operates at 1100° F. The atmosphere is controlled through hardening and quenching operations and capacity is 1,300 gross lbs. per hour.

R-S Heat Treating unit requires only two men instead of four with the conventional type. Production rate is up 50% . . . quality is uniformly high ... and the unit paid for itself in 22 months.

Why not put these savings into your heat treating? Write today for your copy of the booklet on better heat treating. Ask for R-S 200. No obligation.

R-S FURNACE CO., INC.
North Wales, Pa.

Car Hearth Furnaces
Continuous Furnaces
Rotary Type Furnaces

R-S
FURNACES

Truckloads, carloads, part loads—

Get small heads from COMMERCIAL...fast!

We'll load to best suit your receiving facilities — crane, lift truck or manual.

COMMERCIAL daily ships small tank heads 6″ diameter and larger—one head or a full load—to tank builders nationwide. COMMERCIAL has a complete range of sizes—all the standards, many specials. Many rush requirements are shipped right out of stocks available at Youngstown, Ohio, Chicago, Ill., and Salt Lake City, Utah.

Heads can be furnished for code or non-code pressure vessel construction. Available shapes include flanged and dished, ellipsoidal, hemispherical, flanged only, double dished and obround.

COMMERCIAL heads are economical to use. Precision formed in steel dies, they are consistently uniform, right on size. Flanges are straight—fit into shell easier—ideal for automatic welding. They have been preferred by better tank builders for over 30 years.

For full information on small tank heads, whether from stock for immediate delivery or made to your special order, write to Commercial Shearing & Stamping Company, Dept. K-33, Youngstown 1, Ohio.

Specialists in the shape of things to come

COMMERCIAL
shearing & stamping

LETTERS FROM READERS

Reproduced Editorial

Sir—There is enclosed a tear sheet from each of our local papers which will be of interest to you. As you will observe, this (Mr. Campbell's editorial "Our Next President: Lord Have Mercy on Him") appeared in our local papers yesterday—the "Journal Gazette" in the morning and the "News Sentinel" in the evening. Already by word of mouth, telephone and direct communication, we have received very favorable comment on the words of wisdom contained in your editorial. Once again I wish to express our deep appreciation to you for permitting us to reproduce the article. — W. C. Laycock, Fort Wayne National Bank, Fort Wayne, Ind.

Enjoyed Article

Sir—We enjoyed the article entitled "Sensible Buying Boosts Savings" in your June 30 issue. An item at the bottom of this article stated that reprints are available, and we would very much appreciate it if you could send us four copies.—Rita J. Young, Nooter Corp., St. Louis, Mo.

- **They're in the mail.—Ed.**

Wants Reprints

Sir—On p. 51 of your July 28 issue you offer reprints of the article "What the European Market Means to U. S. Business." Also, you announce in your next week's edition another article entitled, "New U. S. Plants in Western Europe." We would like to obtain 10 reprints of each of these articles.—Donald Davis, Donald Davis & Co., Boston.

- **Reprints will be mailed.—Ed.**

European Interests

Sir—Please send us three reprints of The IRON AGE Special Report to Management, "What the European Common Market Means to U. S. Business," which appeared in the July 28 issue. We notice also that in the next issue you will publish a report "New U. S. Plants in Western Europe." We would appreciate three reprints of this article also.—O. H. King, McWane Cast Iron Pipe Co., Birmingham, Ala.

- **They're on the way.—Ed.**

Very Interesting

Sir—The article "Metallic Coatings" in the June 30 issue of your magazine is very interesting, and I would appreciate receiving a reprint of the entire article if possible.—Margaret E. Whiteley, Humble Oil & Refining Co., Houston, Tex.

- **It's enroute.—Ed.**

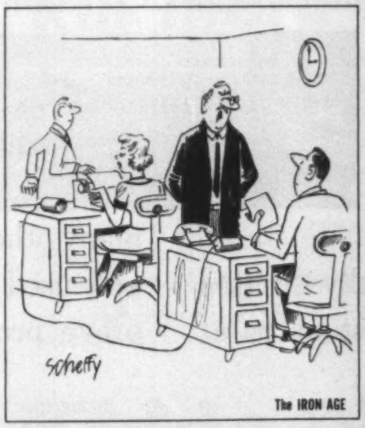
Masterful

Sir—If we could either beg or buy 50 reprints of your masterful section on "Metallic Coatings" in your June 30 issue, we can use them advantageously, even if our competitor's name seems to be spread all over.—J. B. McDonnell, Apollo Metal Works, Chicago, Ill.

- **Request granted.—Ed.**

Profound Truth

Sir—Regarding your editorial in the July 14 edition "Our Next President: Lord Have Mercy on Him." Well chosen words to express a profound truth.—S. I. Roberts, Portsmouth, N. H.



"You know the rule about personal calls, Frisbie!"

MARIAN A. STACHOWIAK, Hayes Induction Heating Engineer, reports . . .

SELECTIVE HEAT TREATING CAN BE SIMPLE . . .

when equipment and application know-how go to work

High-Frequency Induction Heating . . . standard procedure for selective hardening, melting, annealing, brazing, preheating, hot forming, sintering, and vacuum heating . . . now takes a big step forward with another Hayes development — a new high-frequency induction unit that puts selective heating on a *simple* and *economical* basis.

PUSH-BUTTON Controls are featured with this new Hayes induction heater to obtain instant and exact heat distribution at any desired surface area of a steel part. Heating and quenching cycles are *automatically controlled* and are so rapid that distortion, decarburization, and excessive oxidation are practically eliminated. Protective atmosphere systems (pioneered by Hayes) can be supplied as an integral part of the induction unit.

UNIT Design Saves Space — because heater stations and power generator are incorporated in *one* compact cubicle . . . for more output per sq. ft. of floor space. Moreover, the Hayes unit includes work handling devices which can be set up simply, integrated into your production line, and operated as easily as any other machine tool.

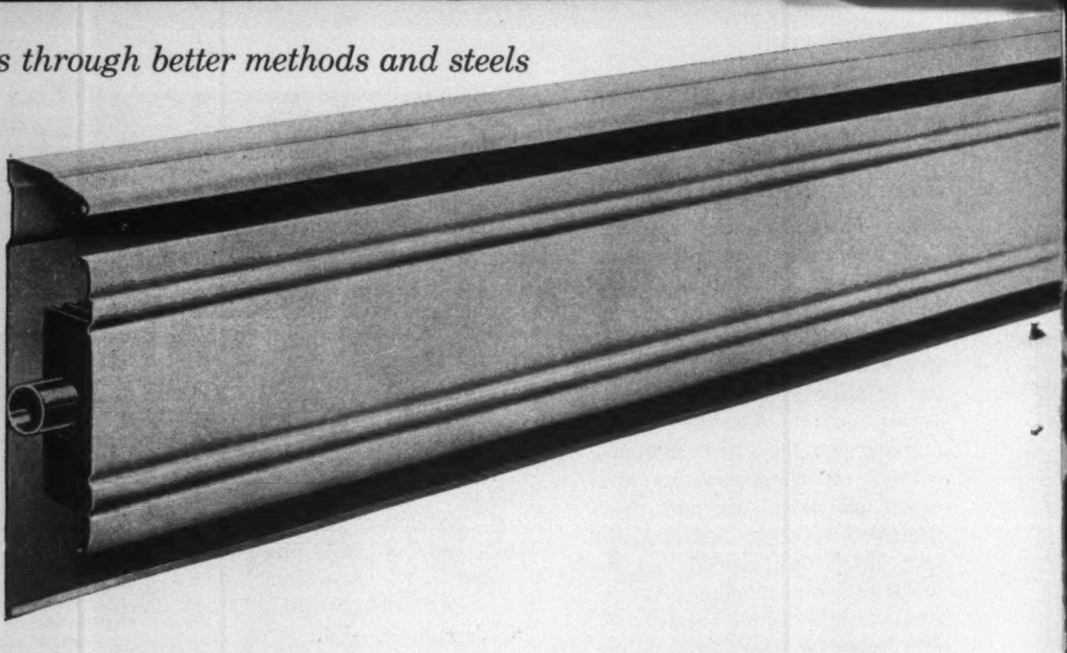
Safe, Easy Maintenance is another feature of Hayes' design. Easy-access panels provide plenty of working room for maintenance and adjustment of components. Safety interlock switches throughout shut off plate power when panels are opened. Write for information on Hayes new induction heating unit, work tables and accessories . . . or other "Results Guaranteed" furnaces in Hayes Certain Curtain line.

FREE BULLETIN 5910

C. I. HAYES, INC.
821 Wellington Ave. • Cranston 10, R. I.
Established 1905

It Pays To See Hayes for metallurgical guidance, lab. facilities, furnaces, atmos. generators, gas and liquid dryers.

Better products through better methods and steels



With Weirzin: easy fabrication of beautiful baseboard heating panels that last and last and last.

This high quality electrolytic zinc-coated and bonderized steel sheet is produced to our customers' requirements for uniformity of gage, width and temper. This attention to quality along with the excellent corrosion resistance provided by the zinc coating puts Weirzin at the top of its category and around the bottom of an increasingly large number of commercial and residential interiors.

There, these baseboard heating panels provide a functional border of beauty that requires little or no maintenance. The chemically treated surface holds the smoothest of paint jobs and the tight zinc steel bond eliminates all possibility of underfilm corrosion. Proof that despite the severe bending and forming it undergoes, Weirzin maintains a flawless bond between the zinc coating and the steel sheet.

Result? The fabricator enjoys the workability of a fine product and the ultimate consumer benefits from its serviceable beauty. And that's true of any product made from Weirzin.

Strong, smooth Weirzin electrolytic zinc-coated steel is manufactured by Weirton Steel Company. Its high quality is typical of the many other steels produced by Weirton and used throughout industry to improve products, methods and profits.

Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

WEIRTON STEEL

Weirton, West Virginia

WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

COMING EXHIBITS

Machine Tool Exposition — Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

Production Engineering Show — Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Coliseum Machinery Show — Sept. 7-15, Chicago. (Contact: A. B. Perkins, 2216 South Hill St., Los Angeles 7, Calif.)

Iron & Steel Show — Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

Metal Show—Oct. 17-21, Convention Hall, Philadelphia. (American Society for Metals, Metals Park, Novelty, O.)

Die Casting Exposition & Congress—Nov. 8-11, Detroit Artillery Armory, Detroit. (The Society of Die Casting Engineers, 19382 James Couzens Highway, Detroit 35.)

MEETINGS

SEPTEMBER

American Machine Tool Distributors Assn.—Annual meeting, Sept. 3-4, LaSalle Hotel, Chicago, Association headquarters, 1500 Massachusetts Ave., N. W., Washington 5, D. C.

Assn. of Lift Truck & Portable Elevator Mfrs.—Fall meeting, Sept. 12, The Cavalier Club, Virginia Beach, Va. Association headquarters, One Gateway Center, Pittsburgh 22, Pa.

Electronic Industries Assn. — Fall conference, Sept. 13-16, French Lick-Sheraton, French Lick, Ind. Association headquarters, 1721 DeSales St., N. W., Washington, D. C.

American Die Casting Institute—Annual meeting, Sept. 14-16, Edgewater Beach Hotel, Chicago. In-

(Continued on P. 16)

NEW!

Kidde
PRESS LEVER
DISCHARGE AT BASE OF FLAME
KEEP ERECT
DRY CHEMICAL FIRE EXTINGUISHER
Kidde
PRESS LEVER
DRY CHEMICAL FIRE EXTINGUISHER

2½-lb.
Pressurized
Dry Chemical

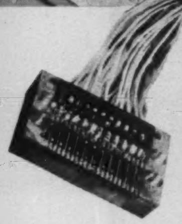
5-lb.
Pressurized
Dry Chemical

Kidde dry chemicals kill more fire faster!

Granted top rating by Underwriters' Laboratories, these two new Kidde dry chemical extinguishers pack the *extra* punch you need to knock out stubborn blazes. These 2½- and 5-pound Kidde units put out as much fire as eight and sixteen one-quart carbon tetrachloride portables respectively. They are perfectly balanced for fast action, are light in weight, easy to operate even while wearing gloves. And – no pin to remove, no valves to turn, no inverting or bumping needed. Just aim at fire and press the lever! Pressurized, they can be easily and quickly recharged with air or nitrogen. No pressure cartridge needed. Write for more information on these new Kidde extinguishers – easiest-to-operate of all dry chemical portables.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.,
849 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver



How Shepherd Industries Zooms the magnification to fit the job

Shepherd Industries, Inc., Nutley, N. J., makes micro-miniature magnetic heads for the memory drums and magnetic tape transports of computer systems. Here is an example of the assembly and inspection operations that keep their B&L StereoZoom® Microscopes busy eight hours a day.

Multiple layers of barely visible wire are wound uniformly around a micro-thin core. Coil-and-core assemblies must be inserted between spacers without scraping the magnet wire—working to tolerances in the area of .0004". A touch of the B&L zoom dial provides continuously variable magnification—from low power, for better views of deep recesses, to high-power blow-ups of critical areas—yet the long, unobstructed working distance remains constant.

"This work would be impossible without microscopes," says Merrill Jewett, Supervisor of Magnetic Head Production, "and a lot harder without these new B&L StereoZoom instruments."

Could be that B&L StereoZoom Microscopes can help you produce the impossible, or at least make what you're doing now a little easier, a little faster, a little more profitable. Now's a good time to find out.

BAUSCH & LOMB INCORPORATED
85208 Bausch St., Rochester 2, N. Y.

☐ Send me new B&L StereoZoom Catalog D-15.
☐ Schedule a demonstration at my convenience.

Name, Title ....
Company ....
Address ....
City .... Zone ...... State ....

BAUSCH & LOMB
SINCE 1853

MEETINGS

(Continued from P. 15)

stitute headquarters, 366 Madison Ave., New York.

National Foundry Assn. — Annual meeting, Sept. 22-23, Edgewater Beach Hotel, Chicago. Association headquarters, 53 W. Jackson Blvd., Chicago.

Porcelain Enamel Institute, Inc.—Annual meeting, Sept. 25-28, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 1145 19th St., N. W., Washington, D. C.

Farm Equipment Institute—Annual convention, Sept. 25-28, The Statler Hilton Hotel, Dallas, Tex. Institute headquarters, 608 S. Dearborn St., Chicago.

American Welding Society — Fall meeting, Sept. 26-30, Pittsburgh. Society headquarters, 33 West 39th St., New York.

OCTOBER

Metal Lath Mfrs. Assn.—Fall meeting, Oct. 6-7, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters, Engineers Bldg., Cleveland.

The Electrochemical Society, Inc. —Fall national meeting, Oct. 9-13, Shamrock Hotel, Houston, Tex. Society headquarters, 1860 Broadway, New York.

American Gas Assn.—Annual convention, Oct. 10-12, Atlantic City. Association headquarters, 420 Lexington Ave., New York.

Pressed Metal Institute — Annual meeting, Oct. 10-14, Shawnee Inn, Shawnee-On-Delaware, Pa. Institute headquarters, 3673 Lee Rd., Cleveland.

Marking Device Assn. — Annual convention, Oct. 12-14, Hotel Roosevelt, New York. Association headquarters, 912 Chicago Ave., Evanston, Ill.

Steel Boiler Institute, Inc. — Fall meeting, Oct. 12-14, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 1308 Land Title Bldg., Philadelphia.

MESTA
INNOCENTI

INNOCENTI **mechanical division**

A clear example of Italian-American cooperation is the Slabbing Plant built by INNOCENTI and MESTA Machine Company for the Cornigliano Company of Genoa, Italy.

main characteristics of the plant

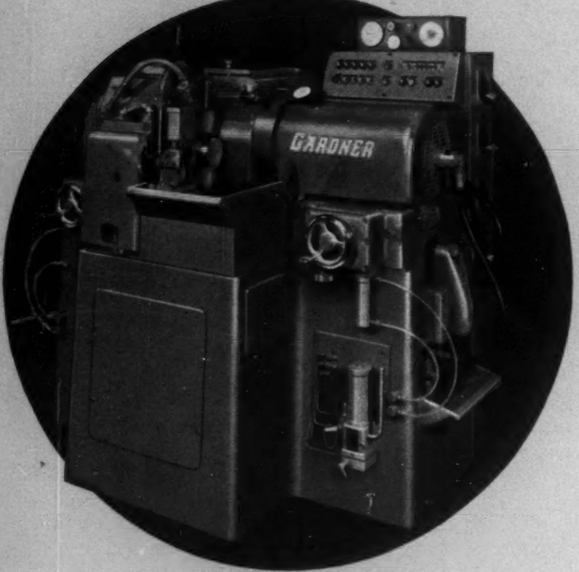
slab: 1890 mm for maximum 30-ton ingots
dimensions of the cylinders: diameter 1160 mm - length 3050 mm
lift 2080 mm at the speed of 13 m/min.

The housing control is of the "twin drive" type operated by two 6000 HP - D.C. motors.

INNOCENTI

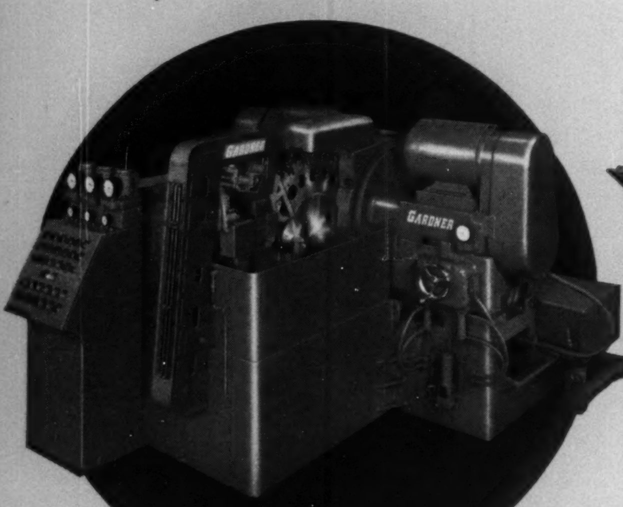
MILANO Via Pitteri 81 - tel. 23.93 ● **ROMA** Via Parigi 11 - tel. 487.051 ● **NEW YORK** 43 West 61 Street - N. Y. 23 - tel. Columbus 5-7795 ● **PARIS** 6, Av. F. Roosevelt - VIII - tel. Balzac 03-51 ● **LONDON** U.K. Representative - Uganda House - 58/59 Trafalgar Square, W.C. 2 - tel. Whitehall 2075 ● **CARACAS** Edif. Sudameris Avenida Urdaneta y Fuerzas Armadas - tel. 545.461

see Gardner...



2H10–15″
Completely new machine grinds sides of instrument bearing inner races to ultra-precision tolerances.

2H20–23″
Grinds both ends of 15,000 bearing rollers per hour. Completely automated—loading, grinding, unloading.

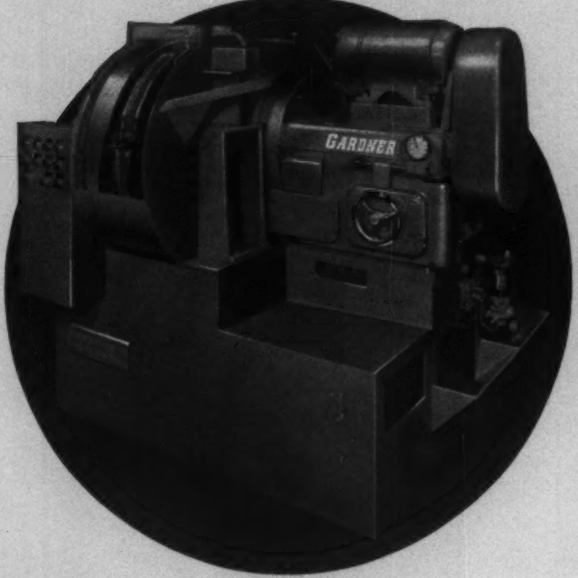


2H30–30″
Complete automated grinding of universal joint spiders including dressing and mechanical work indexing.

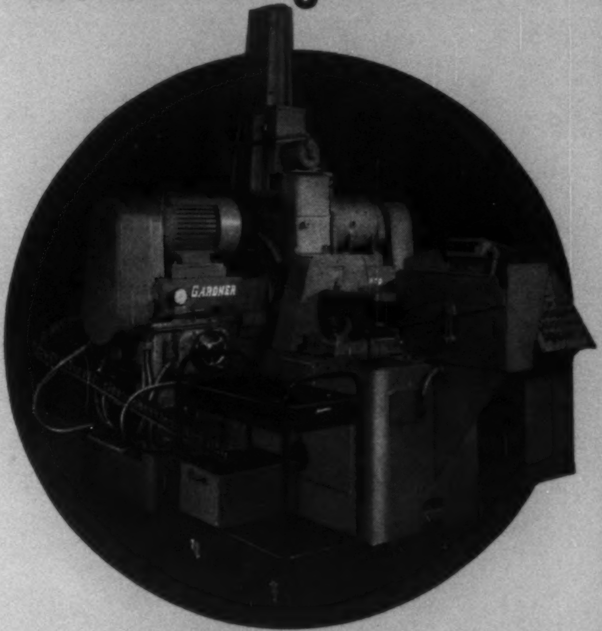
2H40–42″
Unequal areas of parallel sides of large, thin aluminum workpieces ground in rotary work carrier.

booth 811 ...... MACHINE TOOL EXPOSITION

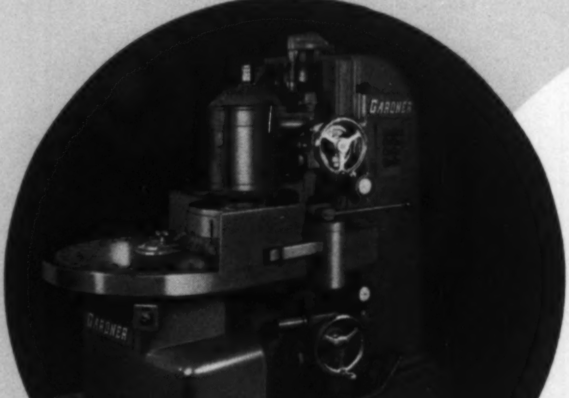
the newest developments in disc grinding
the world's most complete line of disc grinders



1H20–23"
Completely new single spindle grinder with automatic work handling and in-process gauging. Grinds valve ends.



2H30–30"
Grinds bi-metallic thrust washer to flatness and parallelism of .0005". Features new shake-free ball dresser.



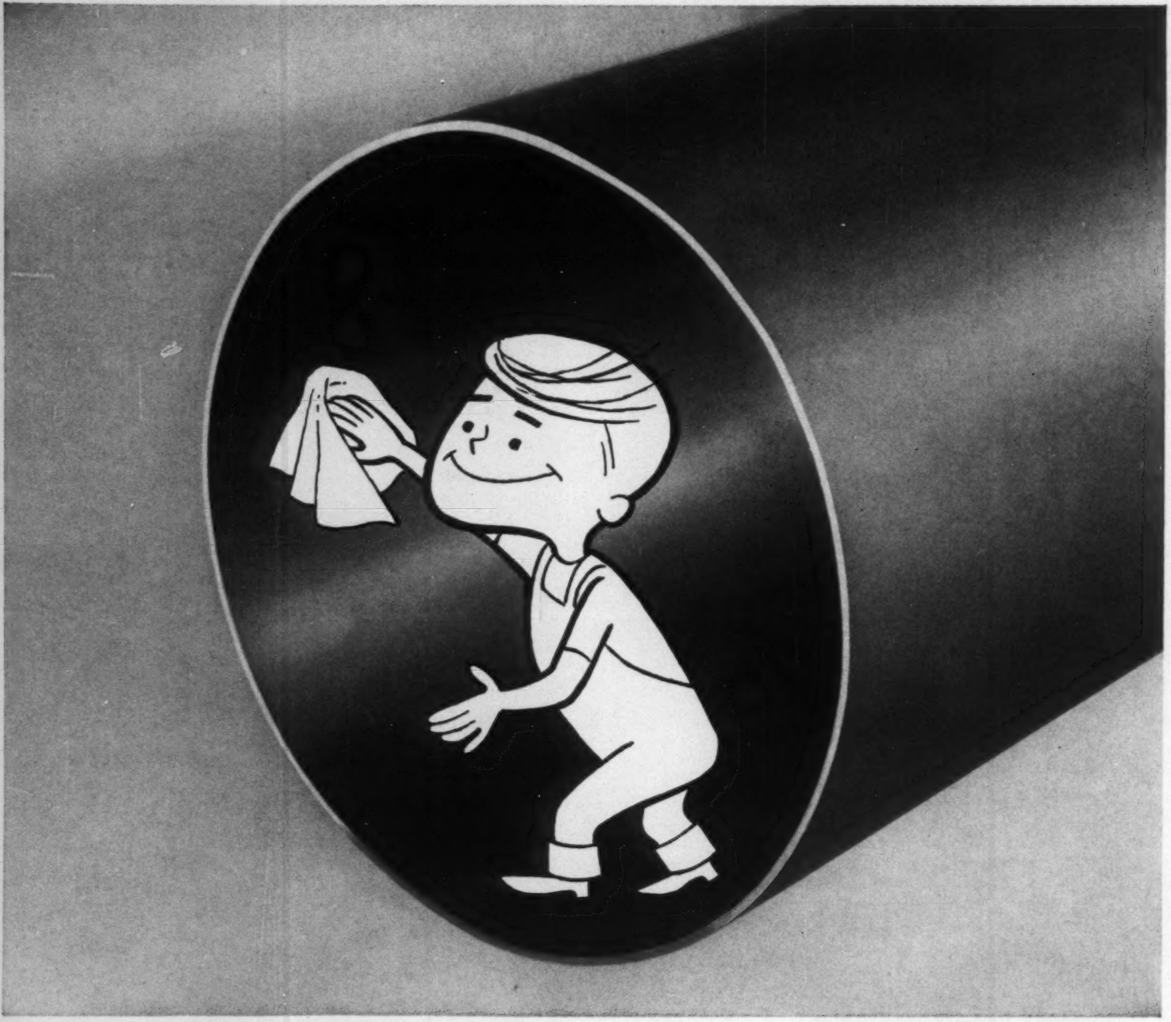
2V18–18"
Grinds both sides of small gears, in one operation, to .0003" flat and parallel.

new designs
new features
new methods

GARDNER

precision disc grinders
abrasive discs

BELOIT, WISCONSIN

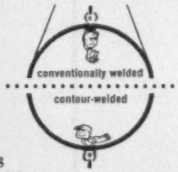


"The Gravity Kid" shows how

YOU CAN STOP CONTAMINATION WITH THE HELP OF CONTOUR-WELDED STAINLESS TUBING

In tubing, surfaces that are microscopically rough and ragged can cause contamination—simply because of the product becoming incrustated. Contour-welded tubing helps lick this problem because it's smoother inside than any other tubing, welded or seamless.

This smooth surface is the result of Contour-welding, a patented* process that eliminates the weld bead. Unlike conventionally-welded tubing, it's welded at the bottom. Gravity pulls the molten metal down so that the weld area corresponds to the inside contour of the tube. There's no bulge on the inside surface. Even on the outside, the seam closely conforms to the tubing shape.



In conventionally-welded tubing, gravity pulls the molten metal down into the tube, forming a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal points for incrustation.

Even seamless tubing isn't as smooth as Contour-welded tubing. That's because it's extruded or pierced, whereas Contour-welded tubing is formed from uniformly rolled strip steel.

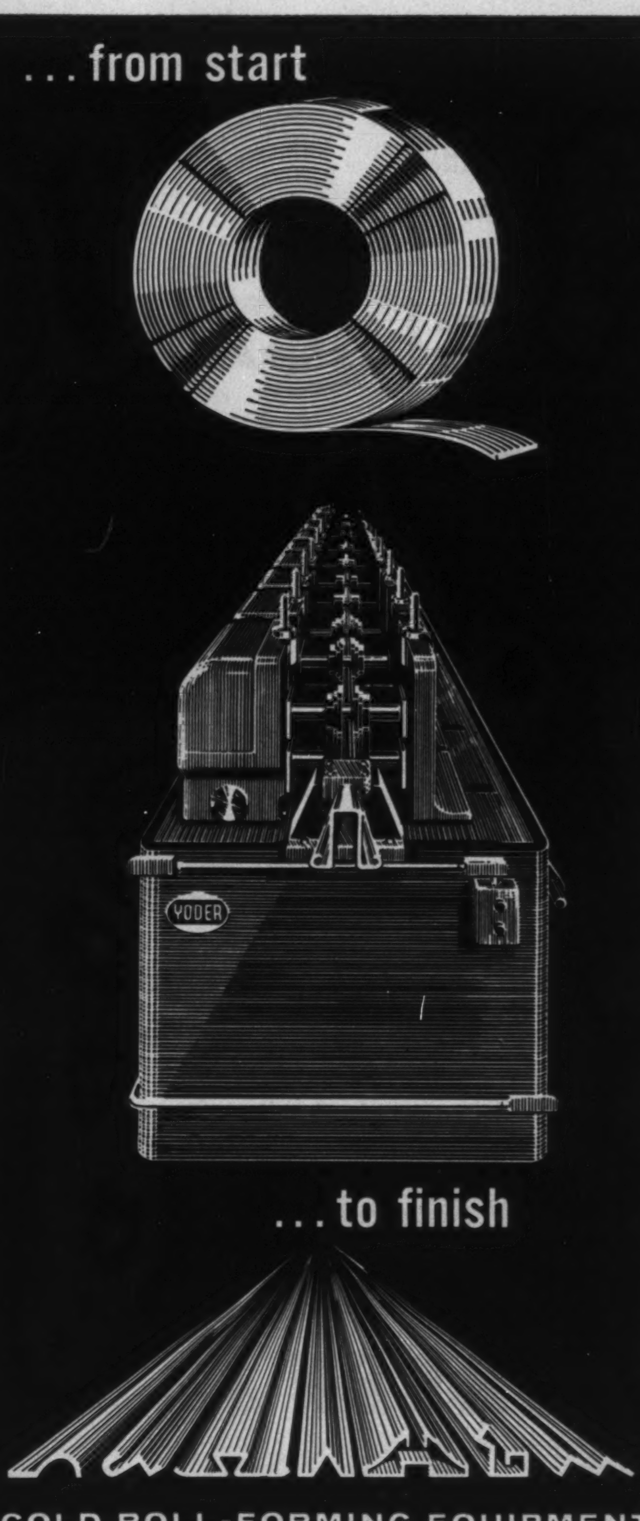
But see for yourself. Write today for our free 48-page manual, which describes sizes from 1/8" to 40" O.D., in stainless and high alloy steels, titanium, zirconium, zircalloy, and Hastelloy**.

* U.S. Patent 2,716,692

**Trademark Haynes Stellite Co.

TRENTWELD® Stainless and High Alloy Tubing

Trent Tube Company, a Subsidiary of Crucible Steel Company of America, General Offices and Mills: East Troy, Wisc.; Fullerton, Calif.



COLD ROLL-FORMING EQUIPMENT

PIPE AND TUBE MILLS (ferrous or non-ferrous)
ROTARY SLITTING LINES

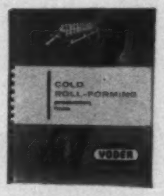
YODER ROLL-FORMING EQUIPMENT

Profits are available to you through the production of many shapes in metal... made with precision and economy on Yoder Cold Roll Forming Equipment.

Produce tubular, ornamental or structural shapes from a variety of metals in widths from a fraction of an inch up to 80 inches or more, and in stock up to ¾" thick. Your investment is comparatively modest, and with proven low operating costs, will give you one of the most profitable operations in your plant.

Experienced Yoder engineers will, without obligation, study your annual metal forming requirements. Many times they can point out that the installation of roll forming equipment would—even if operated only intermittently—soon justify its initial cost.

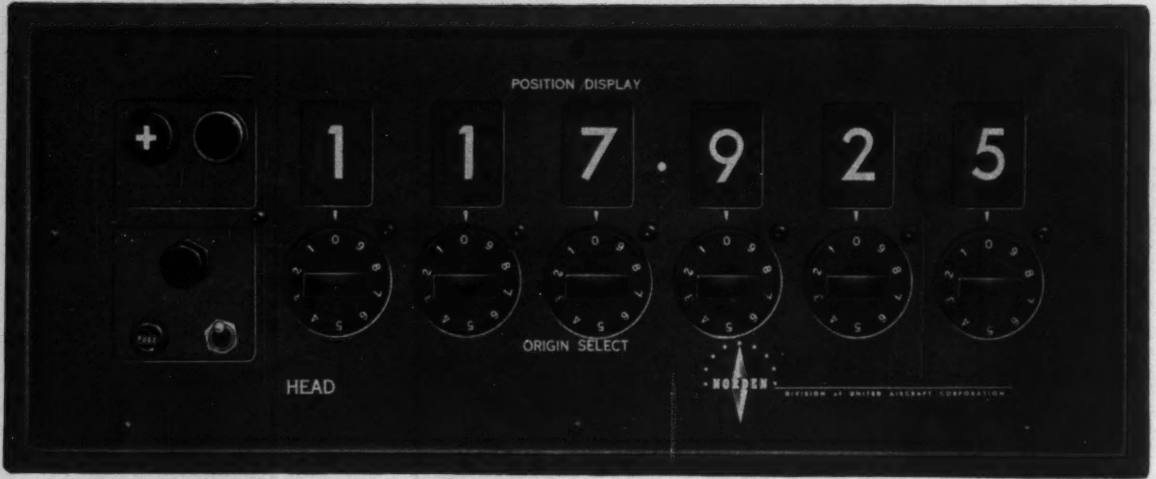
Send today for this comprehensive, 88-page illustrated text. It fully describes Cold Roll Forming Equipment, processes and products.



THE YODER COMPANY
5510 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING
YODER
MANUFACTURING

SEE IT AT CHICAGO


POSITION DISPLAY
117.925
ORIGIN SELECT
HEAD
NORDEN
DIVISION OF UNITED AIRCRAFT CORPORATION

Modumatic Systems Control–Display

MEASUREMENT • POSITION • INSPECTION

NORDEN DIVISION

Norden Division of United Aircraft Corporation presents advanced but simple systems applicable to your need for faster, more accurate positioning of tool or workpiece

Norden Modumatic Systems feature readout of actual position, automatic positioning, full range origin select, and controlled programing

FOR MEASUREMENT

Series 100—This system displays in straight decimal form the exact position of the tool or workpiece. One display is used for each axis of motion.

Features—Illuminated numbers, readable from twenty feet—individual plug-in decimal units—display unit can be located on machine or remote.

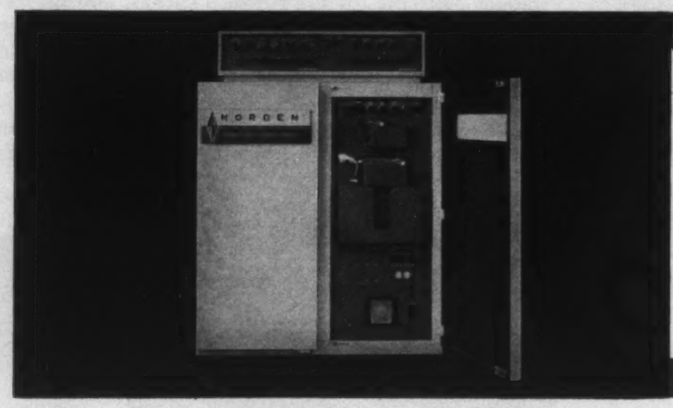
FOR POSITIONING

Series 600—A completely automatic positioning system with input from either manual dial-in switches or punched tape. Display units provide decimal readout of actual position—not command.

FOR INSPECTION

This new Norden concept now makes possible automatic inspection of parts by measuring their exact shape and contour. Since each point on the part's surface has a digital value this information can be easily programmed. Corresponding points on the actual part can be probed automatically and their dimensions compared with the programmed information. The system can be provided with direct numeric print or readout of actual dimensions, deviations from nominal, or out of tolerance indications. In addition, punched tape output is available.

Norden numerical control systems also offer full range electronic origin select. This allows any desired offset to be quickly and easily dialed in by the operator on manual selector switches. In addition, these systems are available with automatic tape punch units for tape preparation "on the machine." This provides a permanent inspection record or a programmed tape for playback applications.



When in Chicago
for the
PRODUCTION ENGINEERING SHOW, NAVY PIER SEE US AT BOOTH 221.
At the National Machine Tool Builders Show see Norden Controlled Machines exhibited by G. A. Gray Company, Booth 1350. Atlantic Machine Tool Works, Booth 543. LaPointe Machine Tool Company, Booth 1229.

For more information contact your nearest Norden Representative. 400 Main Street, E. Hartford, Connecticut, JAckson 8-4811. 11 West Monument Avenue, Dayton 2, Ohio, BAldwin 8-4481, or write us at the address below.

OF UNITED AIRCRAFT CORPORATION
DATA SYSTEMS DEPARTMENT
SANTA ANA, CALIFORNIA

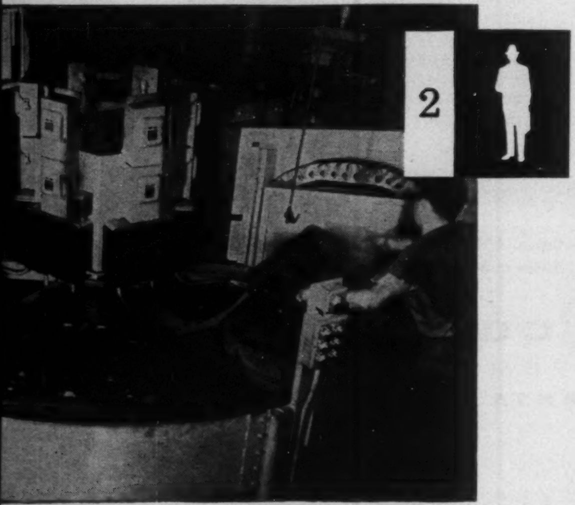
REPUBLIC FOUNDRY SERVICE ENGINEERS CAN HELP YOU PRODUCE

PATTERN MAKING

Republic Foundry Service Engineers offer you more than metallurgical assistance. Their practical foundry experience and thorough knowledge of pig iron behavior qualifies them to assist you in every department of your foundry operation as illustrated on these pages.

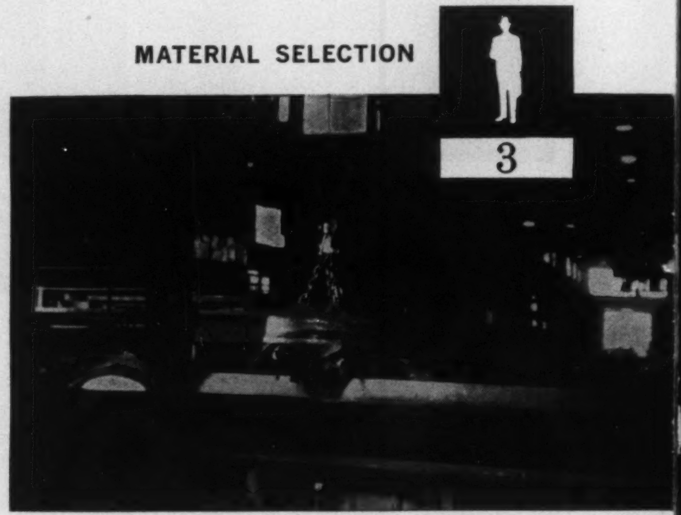
They have at their fingertips information on and a working knowledge of the latest processes and techniques available for improving castings, and for expanding their use and sale. Their suggestions often result in improved operating procedures, increased production efficiency, and in recapturing business lost to other materials.

When it comes to the important matter of pig iron selection, the Foundry Service Engineer recommends



MOLDING PRACTICE

MATERIAL SELECTION



MELTING PRACTICE

BETTER CASTINGS, PROFITABLY

POURING PRACTICE

the grade best suited to your requirements. He shows no prejudice, applies no pressure to promote one grade of pig iron over another, because Republic produces the most complete line in the industry. Northern grades include Chateaugay, Foundry, Malleable, Bessemer, and Basic. Southern furnaces produce Foundry and Basic.

Foundry Service Engineers form the basis of Republic's Complete Foundry Engineering Service—a concept designed to help you produce better castings more efficiently, economically, and profitably. Foundry Service Engineers are available to all foundries without obligation. Mail the coupon for prompt service, or for more information on Republic's complete line of irons.

FINISHING

REPUBLIC STEEL

REPUBLIC STEEL

**PRODUCERS OF INDUSTRY'S
MOST COMPLETE LINE OF MERCHANT PIG IRONS**

**REPUBLIC STEEL CORPORATION
DEPT. IA -9690
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO**

☐ Have a Foundry Service Engineer call

☐ Send more information on Republic Pig Irons

Name____________________Title__________

Company______________________________

Address______________________________

City________________Zone_____State________

Basically mechanical . . . reduces complex electronics. Positive control by direct actuation (no feedback). All controls fully integrated with the machine. So practical it needs no provision for manual operation.

Barber-Colman's New Tape-Controlled Lathe

Tape-r

Understands two languages: . . . digital data and cost

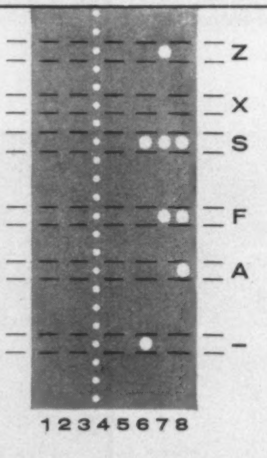
Now, you can gain all practical advantages of numerical control in a Barber-Colman precision lathe that greatly reduces complexity and equipment cost while retaining the ability to turn tapers and form simple radii.

Here is a fresh new approach to numerical control — one that removes any fear of systems incompatibility and leapfrogs into tomorrow's practicalities of low-cost operation and maintenance.

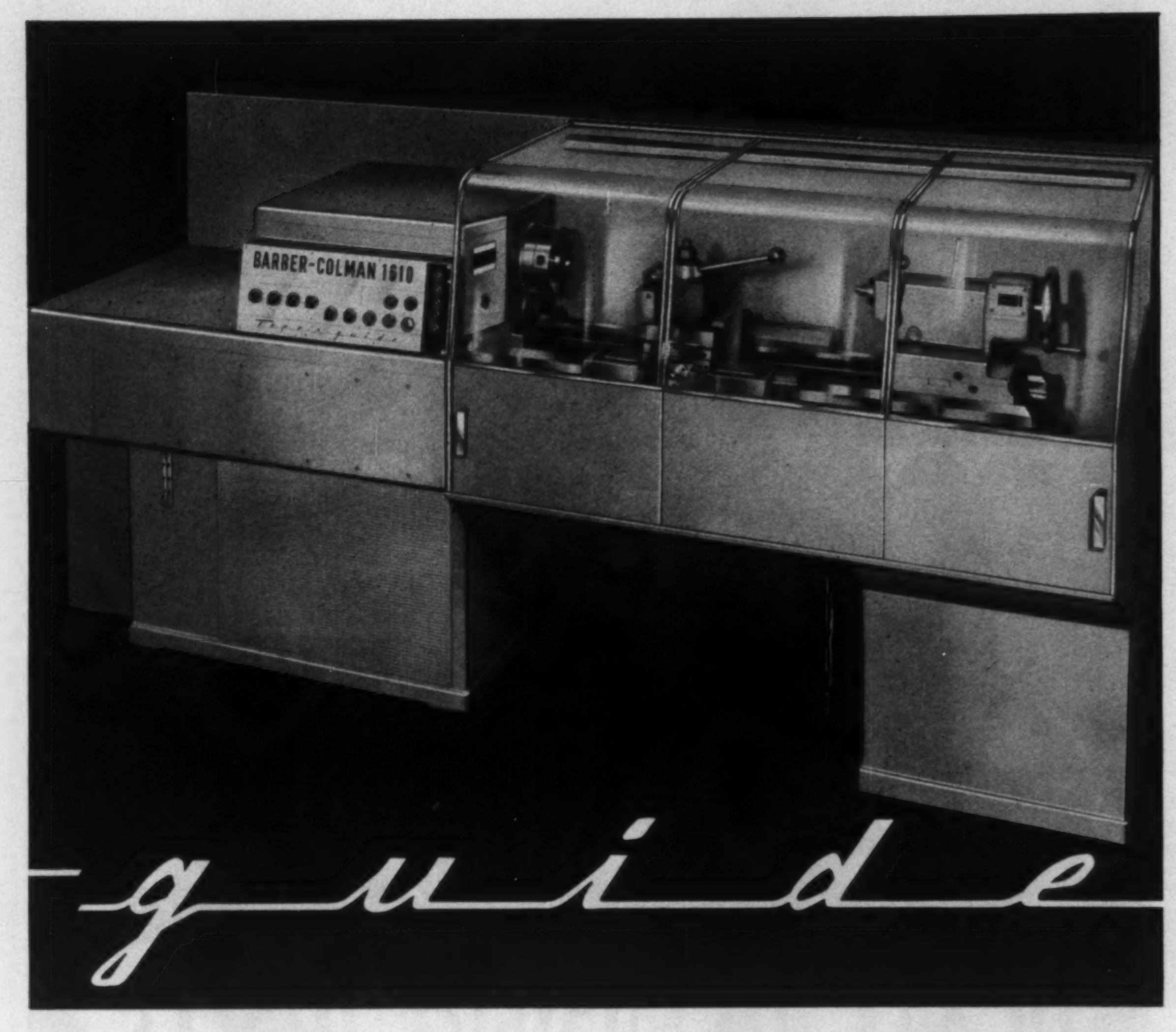
.Now, you can sit in the driver's seat — relieve operating personnel of size control responsibility and set production rates on 90% of your routine jobs fitting a 16" swing lathe. The new Tape-r-guide handles all stop-start, positioning, speed adjustment, and feed change functions automatically from a simple 8-channel binary code tape. It will hold close tolerances on diameter and length, machine all practical tapers without "hunting," cut chamfers without special tools, cutoff and bore or machine at 90° to the work axis—all on a high-performance, precision lathe that has the simplified version of numerical control built-in.

The reader is part of the headstock. Controls are housed in the electrical panel on the back.

The big difference in Tape-r-guide is emphasis on simple and direct mechanical actuation. For example, compound differentials accurately control tapers. Relative speeds of the carriage and cross slide, controlled through mechanical clutches in gear trains, give you true angular tool



Simple coding . . . there are only six types of commands, and only one row is needed to give a complete "axis" command. The channels numbered one through five control rates, while the last three channels identify the command.



paths. There's no sensing and correcting of errors as with a servo drive — no complex electronics or data storage. An electrical signal from the tape reader initiates the mechanical cycle. Cycle then establishes feed rate, spindle speed, and direction . . . as well as any auxiliary functions.

The tape-coding system is simple. Only one row is needed on the tape for a complete axis command. Thus, only a few rows are required for each complete command sequence.

As an incremental system, coding is started from the first operation of the tool rather than from an absolute zero point. The over-all accuracy of the machine is limited only by the system resolution capability . . . plus or minus .001" on diameter and length. The lathe itself is the largest machine of its type on the market, produces super finishes and precision tolerances — fast. It has large swing capacities (16" and 20"), infinitely variable spindle speeds to 1200 rpm, rapid traverse of the cross slide and carriage, rugged frame castings made of dense Meehanite metal. All setup and operating controls are centralized on the headstock panel, adjacent to the tape reader.

Four dials for preselecting spindle speeds are actuated by tape commands at the proper time in the cycle. Another selector puts the machine into single-cycle operation for setup or fully automatic cycling.

Ask your Barber-Colman representative about the low cost of this basically mechanical, fully integrated, high-speed, numerically controlled lathe.

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

See the tape-controlled lathe turning tapers, too, in Booth 923 at the Exhibition. Qualified engineers will be on hand to answer questions.

Barber-Colman Company

BARBER
COLMAN ®

810 Loomis St., Rockford, Illinois

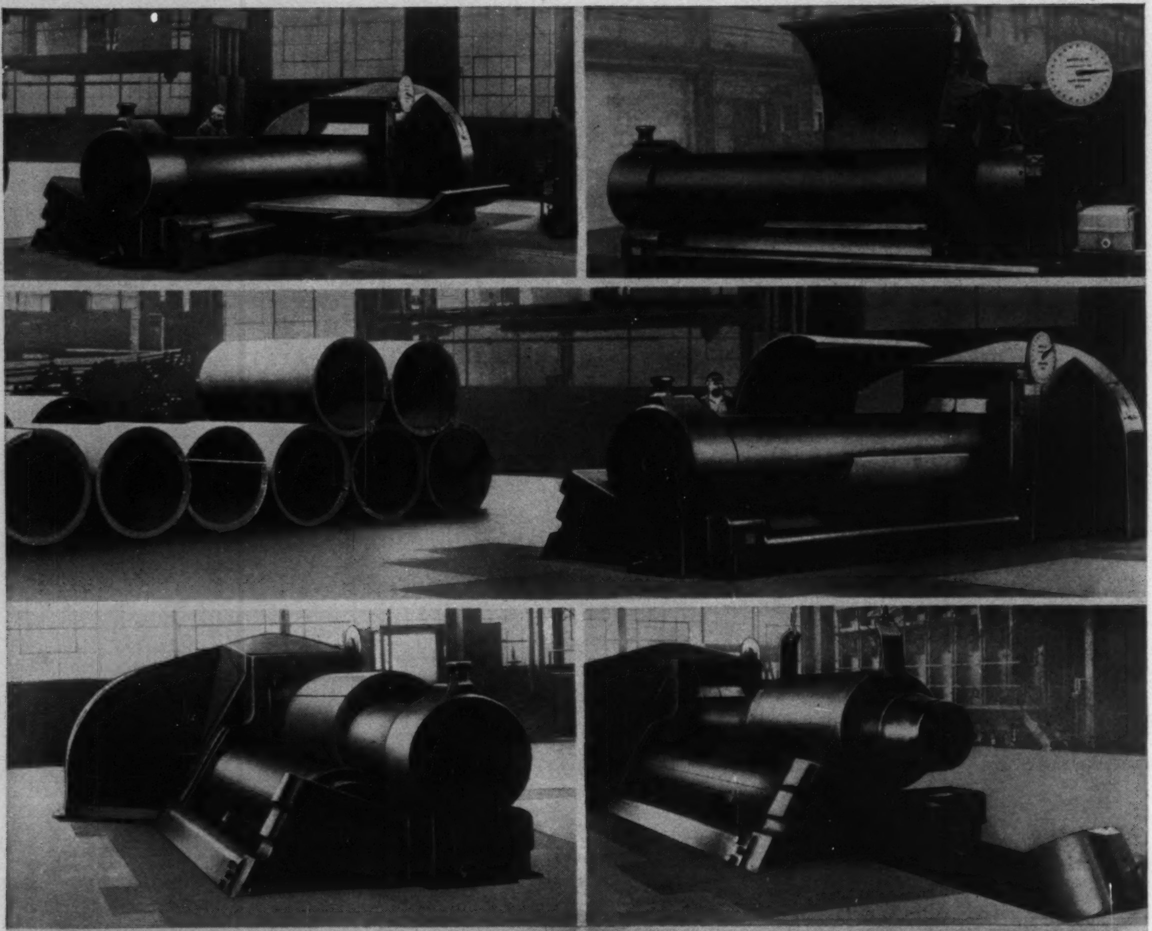


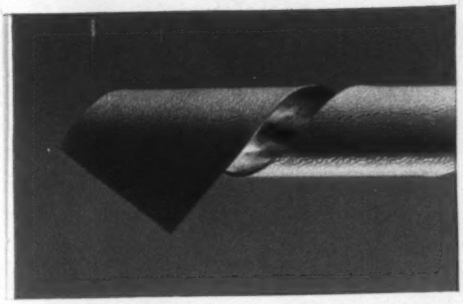
PLATE BENDING ROLLS
INITIAL PINCH TYPE

Rolling A-212 Plates Cold
3" Thick to 38" I.D.

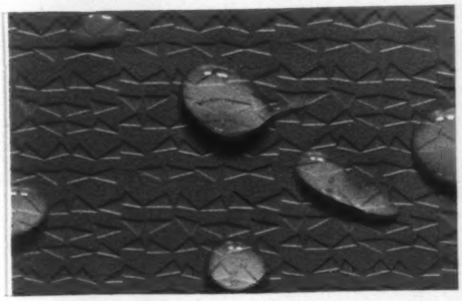
BERTSCH & COMPANY
CAMBRIDGE CITY INDIANA

Advertisers in the Iron Age since 1879

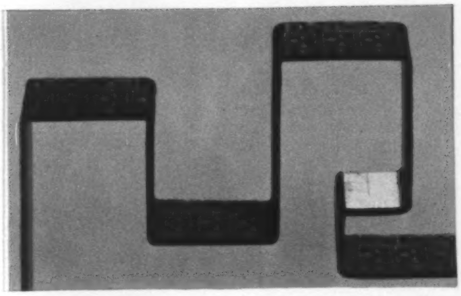
Twist it



Wet it



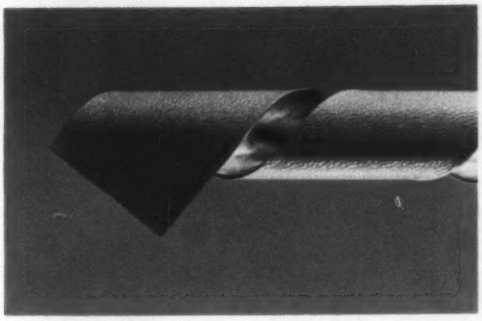
Form it



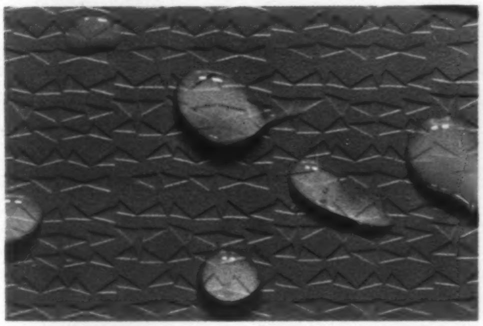
Design with it

USS Vinyl Coated Steel Sheet ● Here is the look and feel of leather or fine cloth, or any other texture you want, bonded and cured directly and permanently to steel. Here is a complete spectrum of color, too, in a material that is inexpensive, versatile, tough enough to take the hard knocks and strong enough to be used in the most demanding applications. USS Vinyl Coated Steel Sheet is easy to clean, resists spotting and staining, can be fabricated easily and inexpensively. It opens up many design possibilities in both consumer and industrial markets. It offers these advantages:

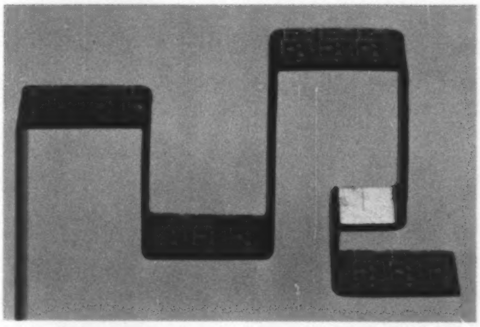
Twist it The surface won't crack or peel. Here is tough vinyl that can be produced in any texture, any color, with the strength of steel.



Wet it Try to spot it. USS Vinyl Coated Steel Sheet won't water spot. You can't stain it with die lubricants, alkaline cleaners, fountain pen ink, alcoholic beverages, detergents, acid cleaners, nail polish, or fruit acids.



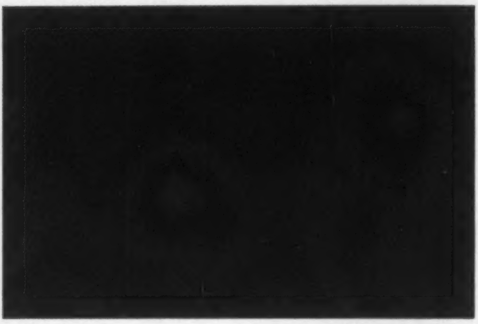
Form it You can slit it, punch it, draw or roll form it. USS Vinyl Coated Sheets can be lock seamed easily. Special processes have been developed so you can weld it with no damage or discoloration to the finish.



Design with it Building interiors, doors, appliances, furniture, automobile and station wagon interiors, railroad car interiors, business machines, store shelving, switch panels, almost any product that is subjected to abuse.

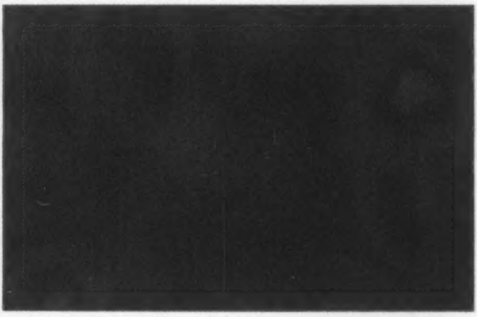
USS Vinyl Coated Steel

TRADEMARK

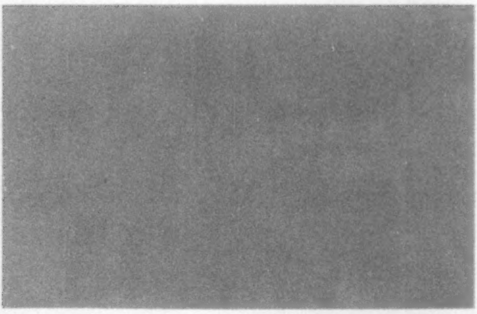


Four examples of the many patterns

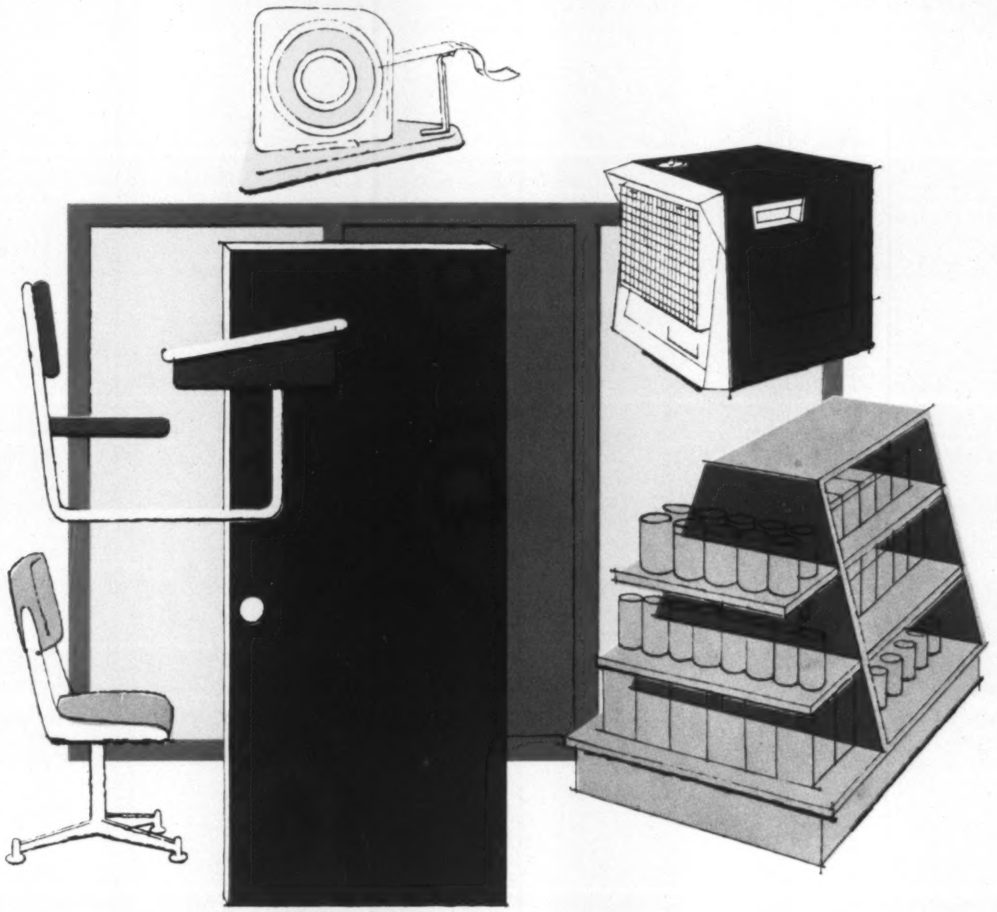
which can be ordered



in vinyl coated steel.



This mark tells you a
product is made of modern, dependable Steel.



Here are just a few suggested applications for USS Vinyl Coated Sheets: ● A colorful room divider or partition. Face panels are interchangeable; panels of different colors or textures can be easily inserted. ● A portable space heater that is scuffproof, also available in any color or texture. ● A lobby door that defies scuffs and hand prints, is easily cleaned; color and texture can adapt to any interior decoration. ● For long term service, smart appearance with practically no maintenance, vinyl steel store shelving meets the requirements of heavy use in any color. ● Contemporary office chairs covered with USS Vinyl Coated Sheet that will last. They look and feel like leather; actually they're strong steel. ● A school desk that will take years of hard knocks, yet look like it's going through its first term. ● For the home, a tape dispenser with extra sales appeal because it has the look and feel of fine leather.

USS Vinyl Coated Sheets can be adapted to these and thousands of other uses. It is competitive in price with other materials. It will not support combustion and it has a dielectric strength of 750 volts per mil of coating thickness. It is available in gages from 16 through 32, widths from 24 to 52 inches, in coils up to 10,000 lb. Vinyl coatings are 0.008 to 0.020 in. thick.

Samples and technical assistance are readily available from U. S. Steel. Or send for our 20-page, full color technical book, "USS Vinyl Steel." Write United States Steel Corporation, Room 6122, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

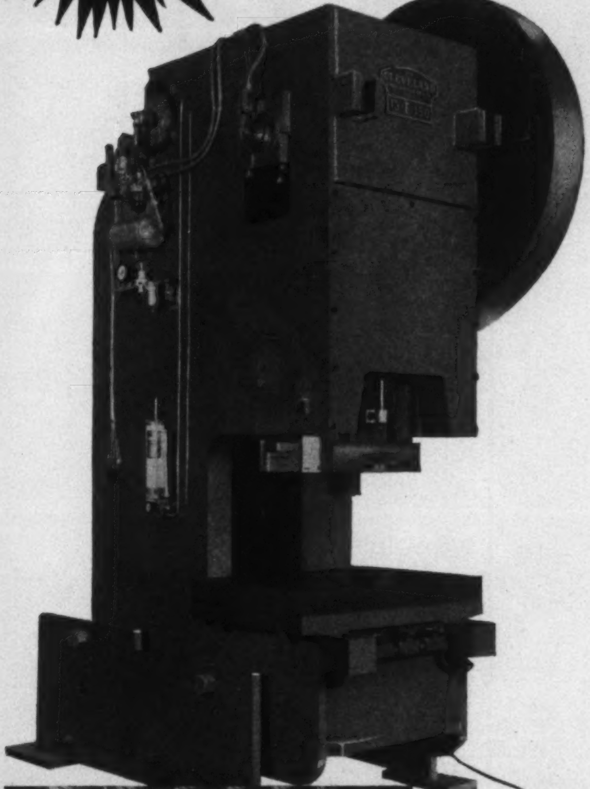
United States Steel

TRADEMARK

...DOES TOUGH JOBS *Dependably, Profitably*

CLEVELAND

NEW **WELDED-FRAME COST-CUTTING** *Open Back Inclinable* **PRESSES**



● Stronger structural frame—streamlined and built to withstand the shock and vibration of heavy-duty stamping.

Dies last longer with less downtime for die maintenance due to Cleveland's large box-type slide that results in greater production accuracy.

75 to 200-ton capacity, built for safer, more efficient operation with all gears and drive mechanism guarded.

Ruggedly built for many different press operations, material can be fed in from either side or from front to back.

Three different positions—vertical, 15° and 30°—to accommodate various types of dies and at the same time make use of gravity feed and discharge in automated production lines, or in operations using a single press.

You get better stampings for less with a CLEVELAND Press—the new welded-frame cost-cutting Cleveland OBI Press.

◀ At the Middletown Manufacturing Co. in Middletown, Ky., this new welded-frame Cleveland OBI Press is blanking and piercing $\frac{3}{16}$"-thick steel for reclining chair fixture parts and blanks for compressor cases. This Model 13-I has 150-ton capacity, 6" stroke of slide, 4" slide adjustment, 30 x 45" bed area and operates at 35 strokes per minute.

Write Today for Cleveland's OBI Press Catalog OBI 3-60

CLEVELAND
OPEN BACK INCLINABLE

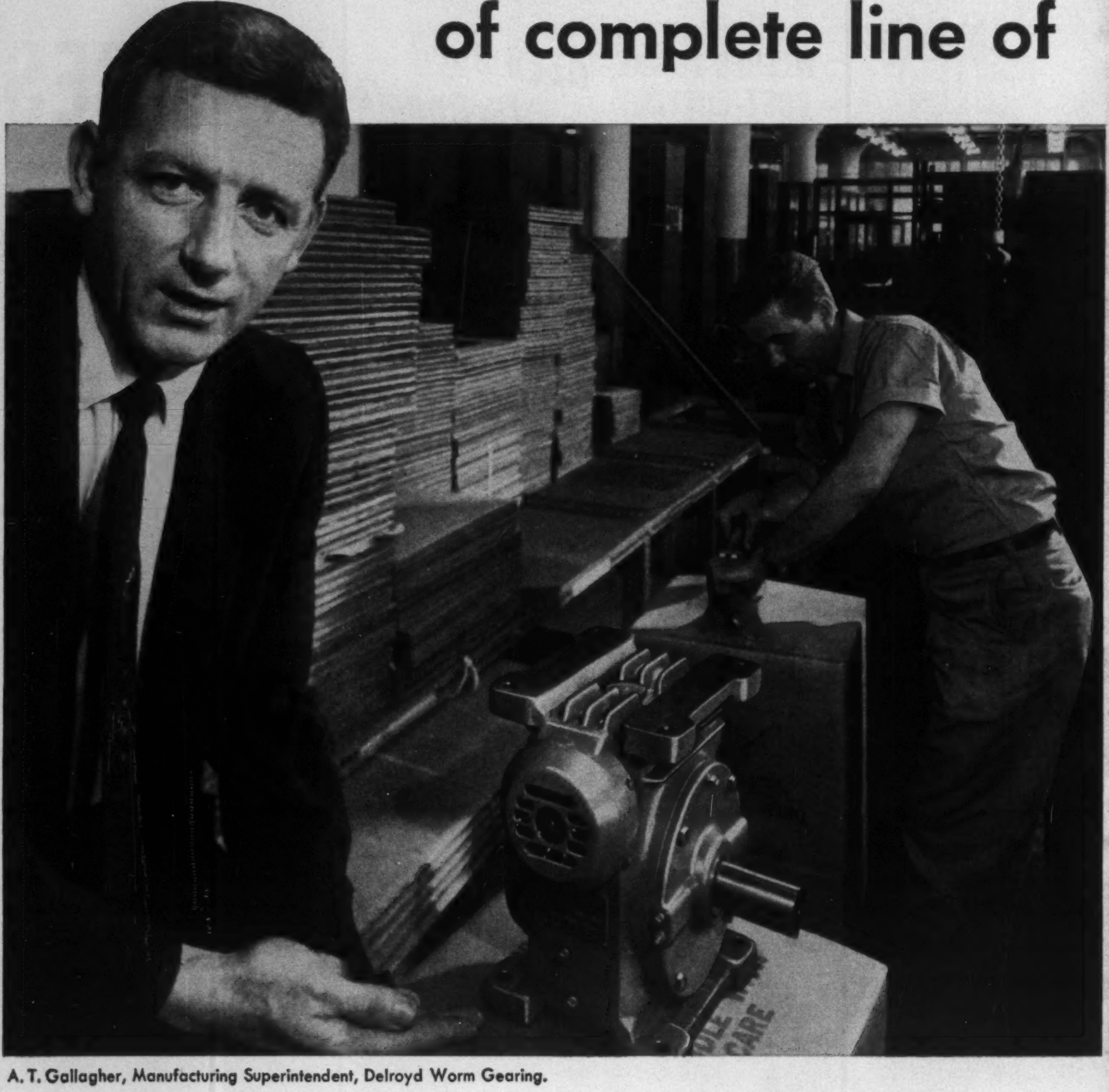
THE
CLEVELAND
PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

A-[illegible]A

"Now get immediate of complete line of

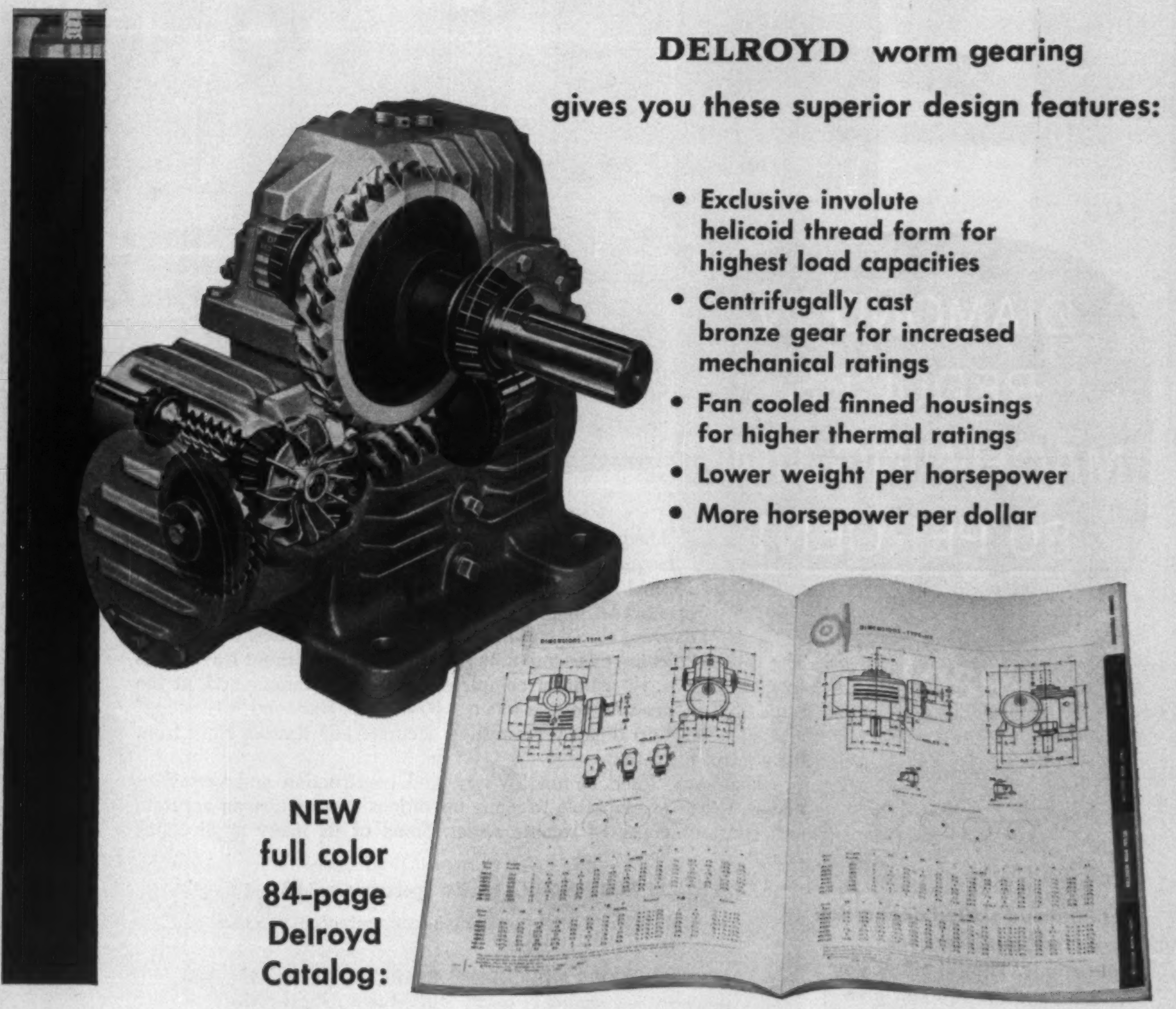


A. T. Gallagher, Manufacturing Superintendent, Delroyd Worm Gearing.

"Here's a shot of our Delroyd Verso worm gear — one of hundreds being boxed and made ready for shipment. Unlike most speed reducers, this Verso unit can be mounted in any position — horizontal, vertical, upside down. • "This is but one model in a complete line of Delroyd worm gear reducers — with the widest range of horsepowers and sizes in the industry."*

*1⅛" center distance, fractional horsepowers — to 12" center distance, 152 horsepower. Reducers to 36" center distance with horsepower capacities to 700 are supplied as standard. Larger units to meet any requirement can be supplied on special orders.

delivery
DELROYD worm gearing…"



DELROYD worm gearing gives you these superior design features:

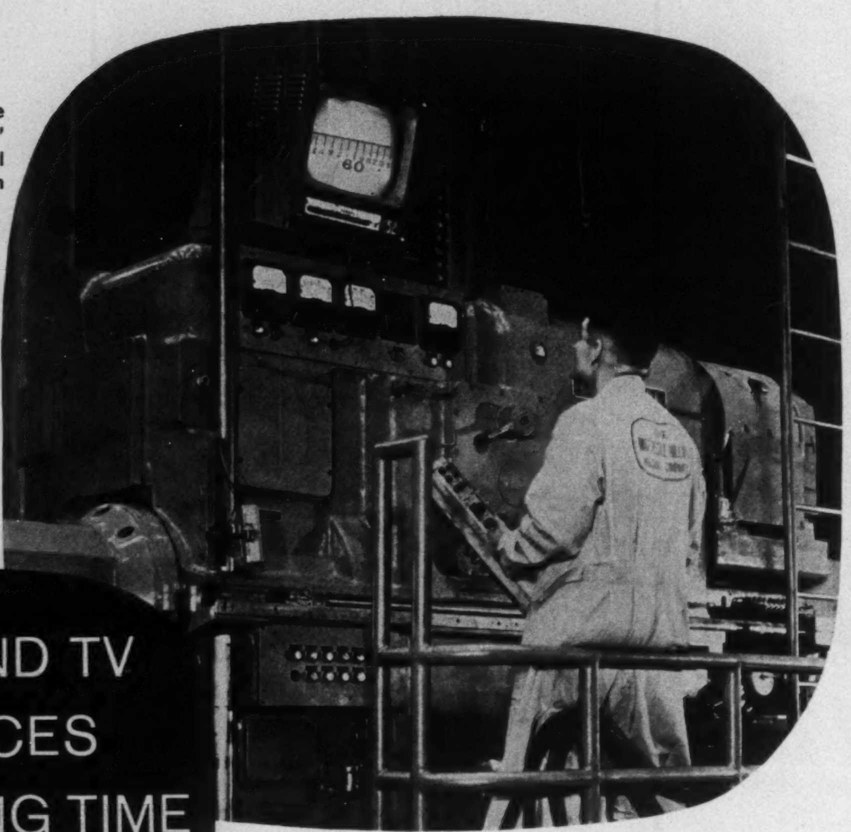
- Exclusive involute helicoid thread form for highest load capacities
- Centrifugally cast bronze gear for increased mechanical ratings
- Fan cooled finned housings for higher thermal ratings
- Lower weight per horsepower
- More horsepower per dollar

NEW full color 84-page Delroyd Catalog:

Now available — the worm gear industry's newest, most complete catalog. Contains all basic design and application data, selection charts, ratings and service factors — plus illustrations in full color. For your free copy, write on your company letterhead to: Delroyd Worm Gearing, De Laval Steam Turbine Company, Trenton, New Jersey.

DE LAVAL STEAM TURBINE COMPANY
899 NOTTINGHAM WAY, TRENTON 2, N. J.

DL-210



. . . operator reads remote scales on "Utiliscope" mounted on control platform

DIAMOND TV REDUCES MACHINING TIME 80 PERCENT

Machining large components to close tolerances requires frequent shut-downs to read remote transverse and longitudinal scales. Morgan Engineering, in conjunction with Ingersoll Milling Machine Co., solved this problem by mounting Diamond closed circuit industrial TV on their new boring mill. The result: machine operators now read both scales without leaving the control station . . . maintain complete machining accuracy and, at the same time, reduce time costs as much as 80 percent. Diamond "Utiliscope" also speeds set-up time by permitting accurate adjustments right from the control platform.

Diamond closed circuit TV's rugged construction and versatility makes it readily adaptable to many operations that require an accurate and constant check of remote scales. Some of its many applications include:

VERTICAL BORING MILLS to view operations up to 8 feet away!

AUTOMATIC WELDING to maintain constant, accurate check of inside diameter welding.

STEEL SHEARING AND CUTTING OPERATIONS to provide continuous visual control of charging slabs into re-heat furnace or hot strip mill and consistently greater accuracy in cutting long length blooms.

FORGING DIES to furnish continuous push-button control in die placement.

Let Diamond skilled application engineers analyze your operations. They'll show you where "Utiliscope" can give you more accurate control, even under the most difficult, hot, dirty, or dusty conditions. Phone Lancaster, Ohio, OLive 3-6540 or TWX 490 and ask for our Field Survey FS33B.

Diamond Electronics

DIVISION OF DIAMOND POWER SPECIALTY CORPORATION
LANCASTER, OHIO

See what's NEW at Booth 452

to help you
make more
for less...

Brown & Sharpe
PRECISION CENTER

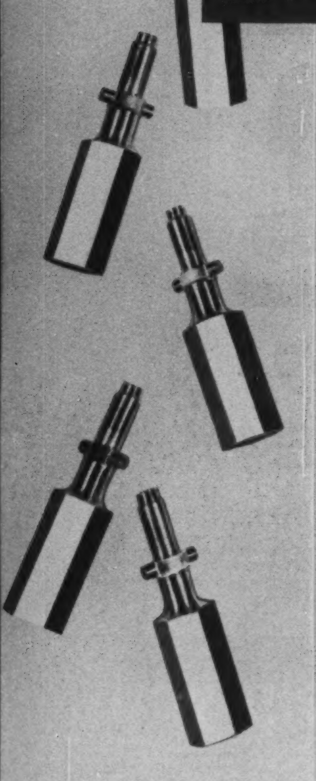
MODERN MACHINE TOOLS
MMT-PE
PRODUCTION EFFICIENCY

MACHINE TOOL
EXPOSITION
1960

MMT-PE

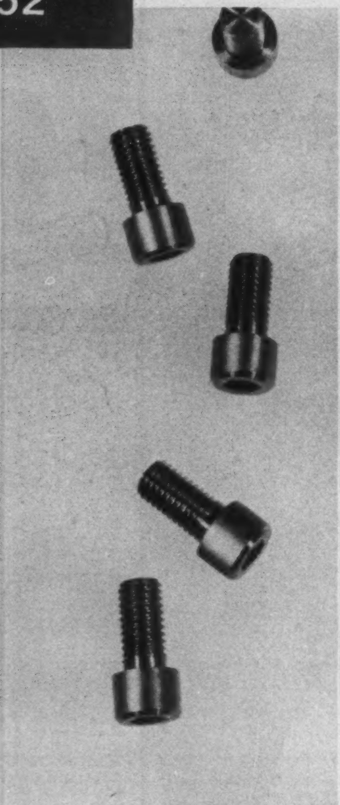
See what's new at Booth 452

TO HELP YOU MAKE MORE
FOR LESS WITH SCREW MACHINES



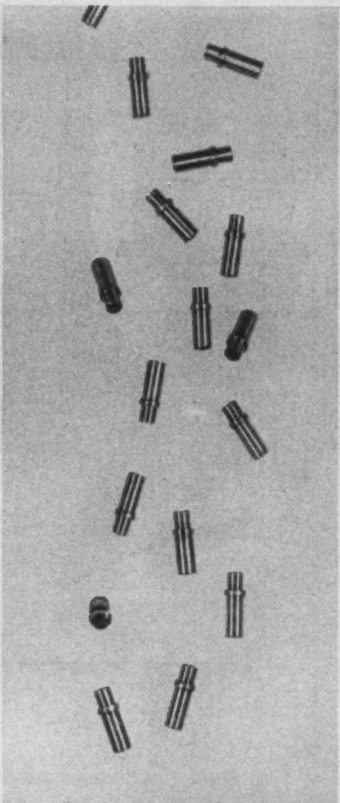
NEW fourth slide permits added operations in cycle

Upper front forming slide has 2 tool holders for turning right or left hand. At upper back is cut-off slide. Both slides are interchangeable.



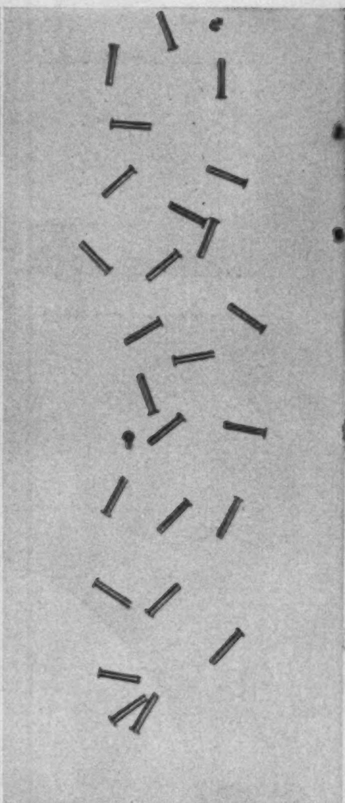
NEW drilling & broaching attachment extends work range

Picks up cut-off piece, drills back end and punch broaches with 18,000 lb. pressure (generated from 80 lb. air). Or, broaches front end.



NEW electronic gaging holds closer tolerances

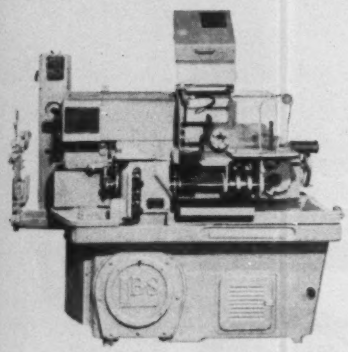
Comparator checks each part from transfer mechanism — shuts off feed at first bad part. Operator resets tools fast by observing "over-under" lights.



NEW faster feeding boosts small diameter parts production

10,000 rpm provided in bar feed mechanism by auxiliary that stops spindle liner momentarily when stock is fed. Eliminates centrifugal problems.

Brown & Sharpe Automatics show dramatic progress in output speed, accuracy, and adaptability



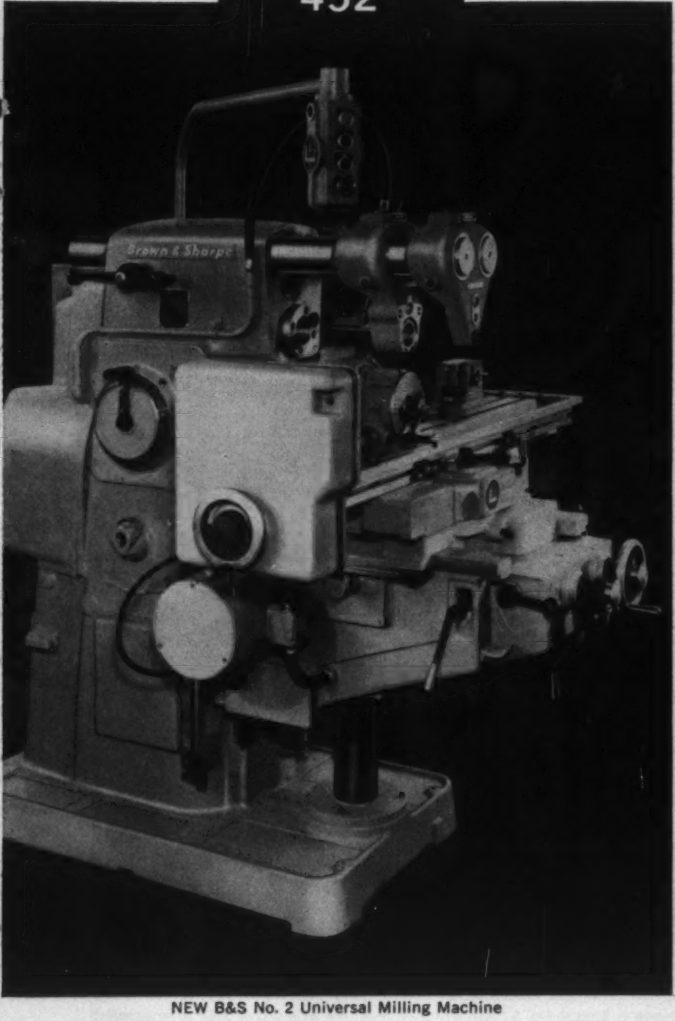
New-design advantages like these in Brown & Sharpe's new Automatic Screw Machines can boost your production rates as much as 100%. Brown & Sharpe is constantly at work improving Nos. 00, 2 and 4 Automatics — to save you money — to give you even better precision and finish — to increase machine adaptability for different types of work.

These four examples of continuing B&S design leadership will be dramatically demonstrated at Booth 452. Stop in and see for yourself why plants that replace old equipment with new B&S automatics can write off the investments in record time, with daily dollar savings. Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

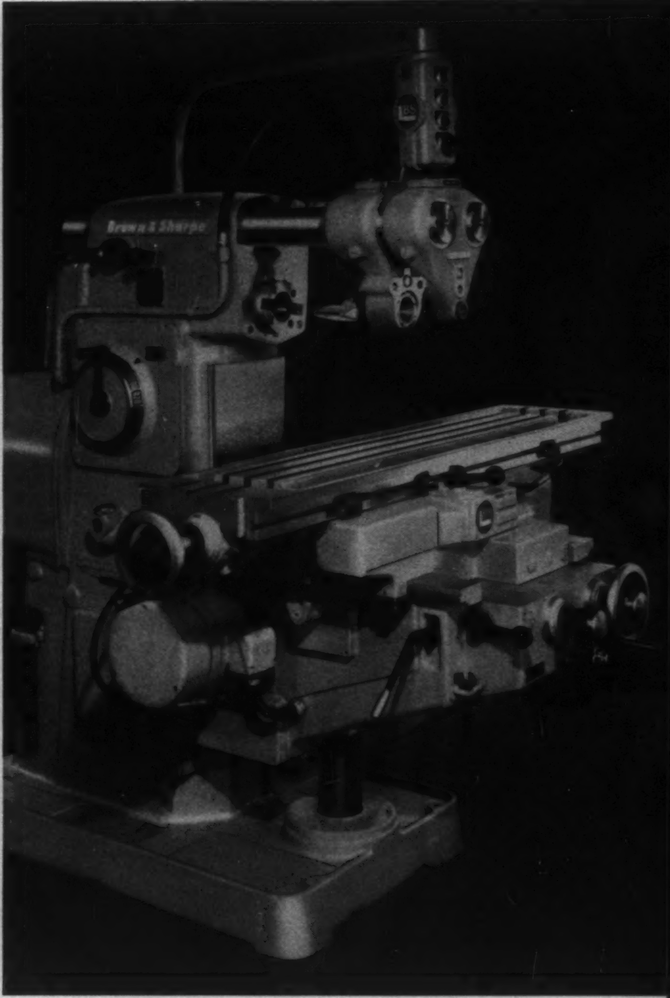
Brown & Sharpe PRECISION CENTER

See what's new at Booth 452

TO HELP YOU MILL MORE FOR LESS



NEW B&S No. 2 Universal Milling Machine



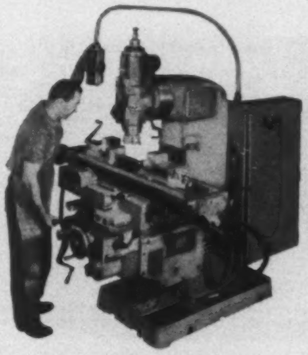
NEW B&S No. 2 Plain Milling Machine

Introducing 14 new B & S DYNAMASTERS - No. 2 Plain, Universal, Vertical; and Rangemasters - 3, 5, 7.5, 5/10 hp

You'll see something new from every viewpoint in the B&S No. 2 Milling Machines on display in Booth 452. And, whatever your specific needs, you'll see why the new series provides every feature you want for top efficiency and economy in your milling operations. Construction with standard units offers a choice of 132 cost-cutting combinations, permits you to select a machine "custom built" to your needs, ready for prompt delivery. The B&S Rangemaster® sliding head type machine, also exhibited, incorporates many of the same advantages.

You'll also see the B&S NUMERICAM Tape-Controlled Cam Milling Machine, which saves up to 90% in cam production costs — and the new Deep Hole Drilling Machine that eliminates the need for expensive fixtures.

See them all at Booth 452 . . . or write for full information. Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.

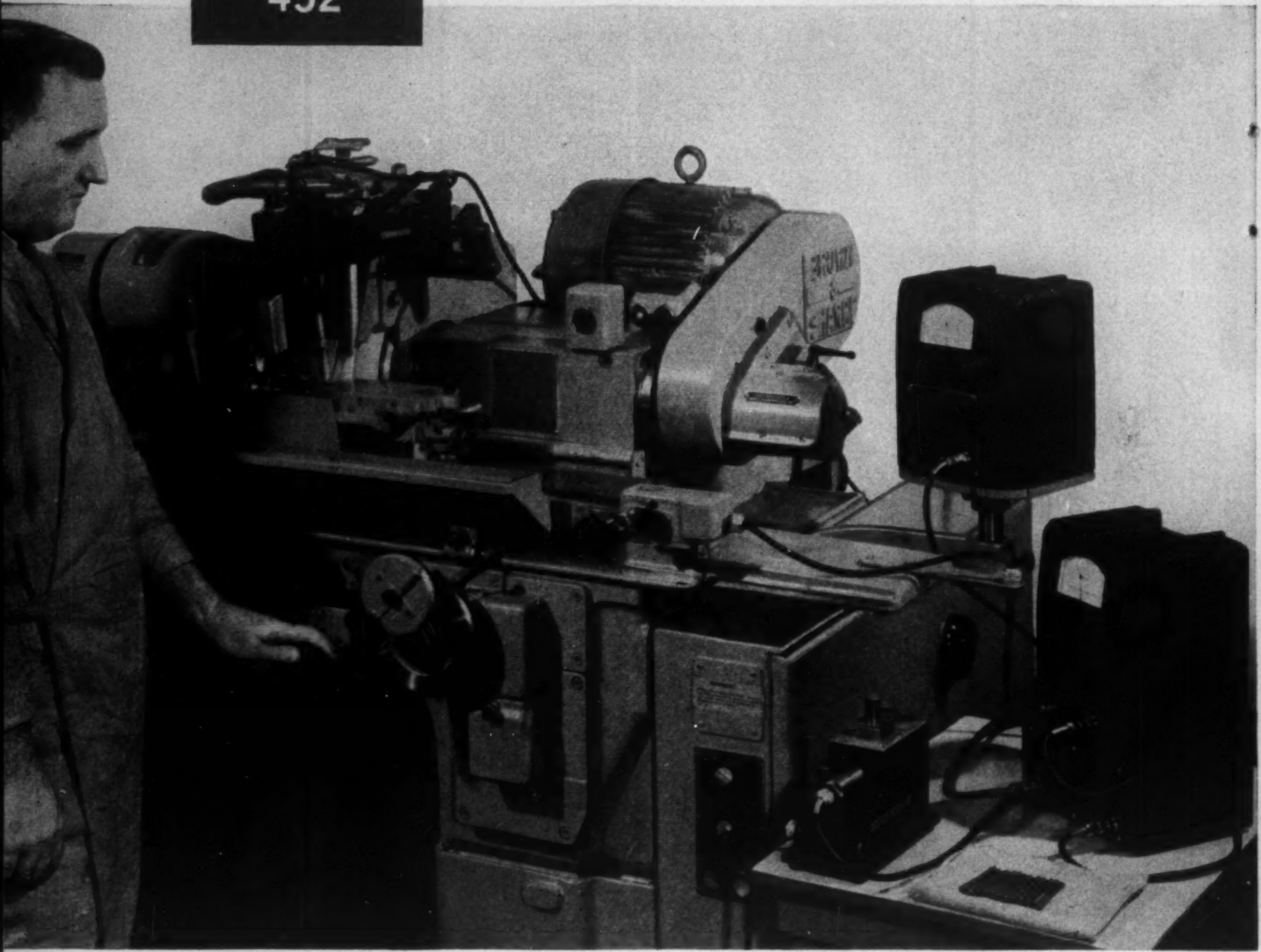


NEW B&S No. 2 Vertical Milling Machine

Brown & Sharpe PRECISION CENTER

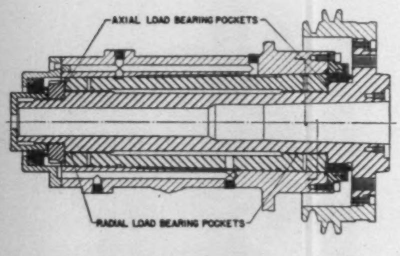
See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS



New Brown & Sharpe No. 5 Plain Grinding Machine with CEDA/SIZE arrangement.

Brown & Sharpe pioneers new concepts in precision with production grinding to ±0.000010″ or less



New Supercise Headstock with hydrostatic spindle bearings for B&S Universal Grinding Machines.

At Booth 452, you'll see the Brown & Sharpe Grinding Machines that are eliminating the slow, high cost methods of sizing to ultra-close tolerances. Demonstrations of the new No. 5 Plain Grinding Machine with CEDA/SIZE show how any size that can be measured can be *duplicated,* within millionths, *by plunge grinding* — with average operators, on a production basis.

Partner in precision is the B&S No. 2 Universal Grinding Machine with the new hydrostatic headstock, which produces split-tenth sizing and super finish.

On display also are the new MICROMASTER 824 and 1030 Surface Grinding Machines, which offer all the advantages of the B&S No. 510 and 618 MICROMASTER Surface Grinders, in machines of greater capacity.

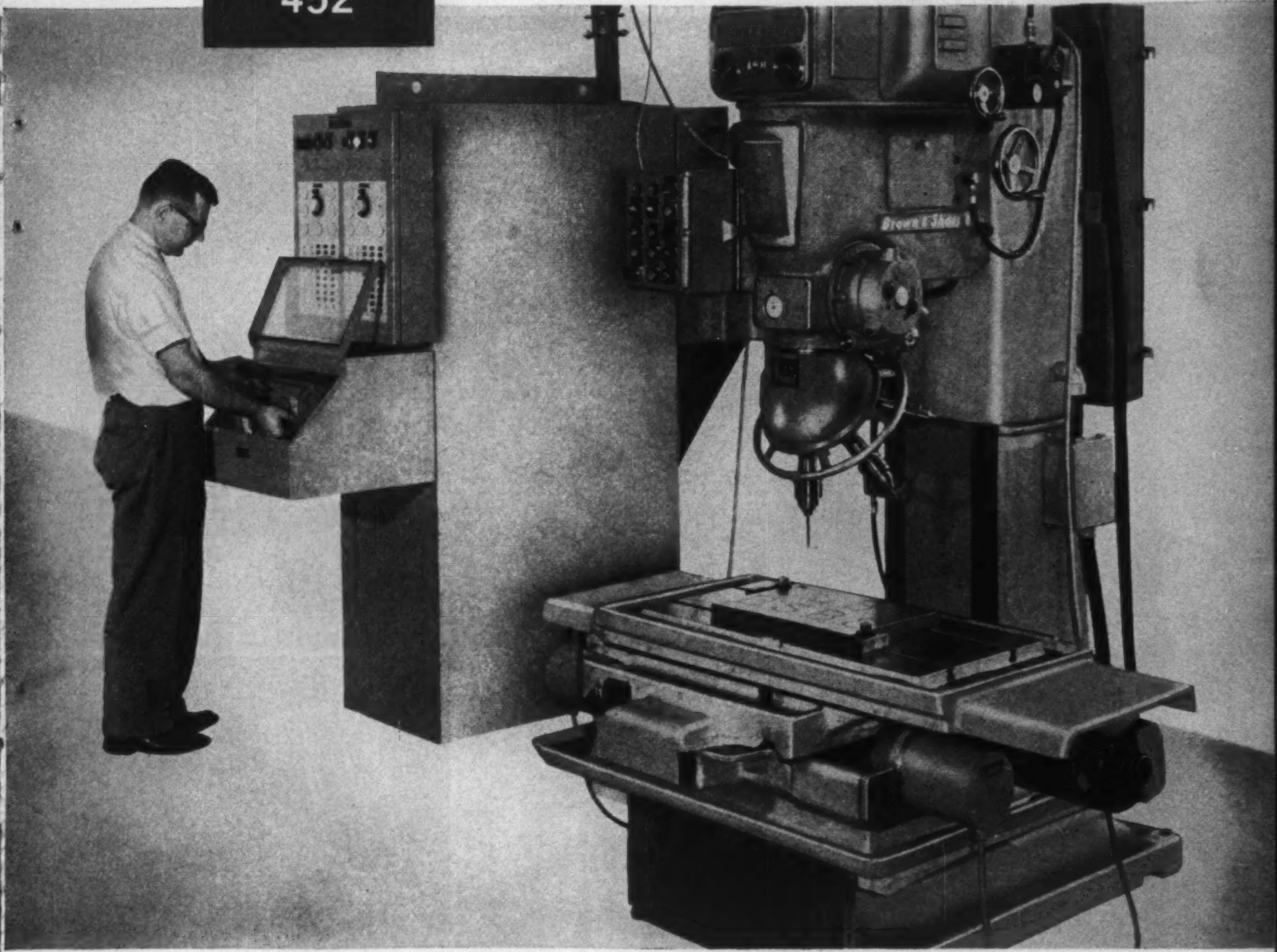
Bring your information on grinding progress up to the minute. Visit Booth 452 . . . or write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence, R. I.

Brown & Sharpe PRECISION CENTER

MMT·PE

See what's new at Booth 452

TO HELP YOU DRILL AND TAP MORE FOR LESS



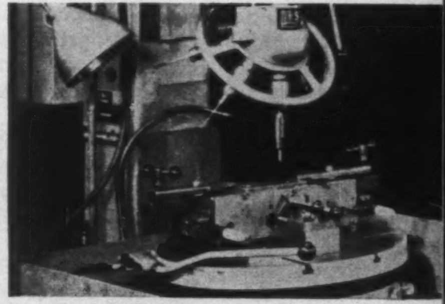
New B&S Model B Turret Drilling Machine with tape-controlled table.

New B&S tape-controlled Turret Drilling permits up to 75 to 1 reduction in tooling costs

Brown & Sharpe Turret Drilling Machines and Work-Positioning Tables regularly score production gains as high as 5 to 1 over conventional gang-drill box-jig methods, with manual or automatic operation. Now, tape-control adds tooling cost savings as high as 75 to 1.

This revolutionary advance in automation of drilling, tapping, reaming, and boring is on view in Booth 452. Completely automatic, fully integrated locating and machining operations are performed by the B&S Model B Turret Drilling Machine and the B&S Work Positioning Table, guided by a tape control.

Plan now to see this dramatic demonstration if you attend the Exposition . . . or write for details: Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.



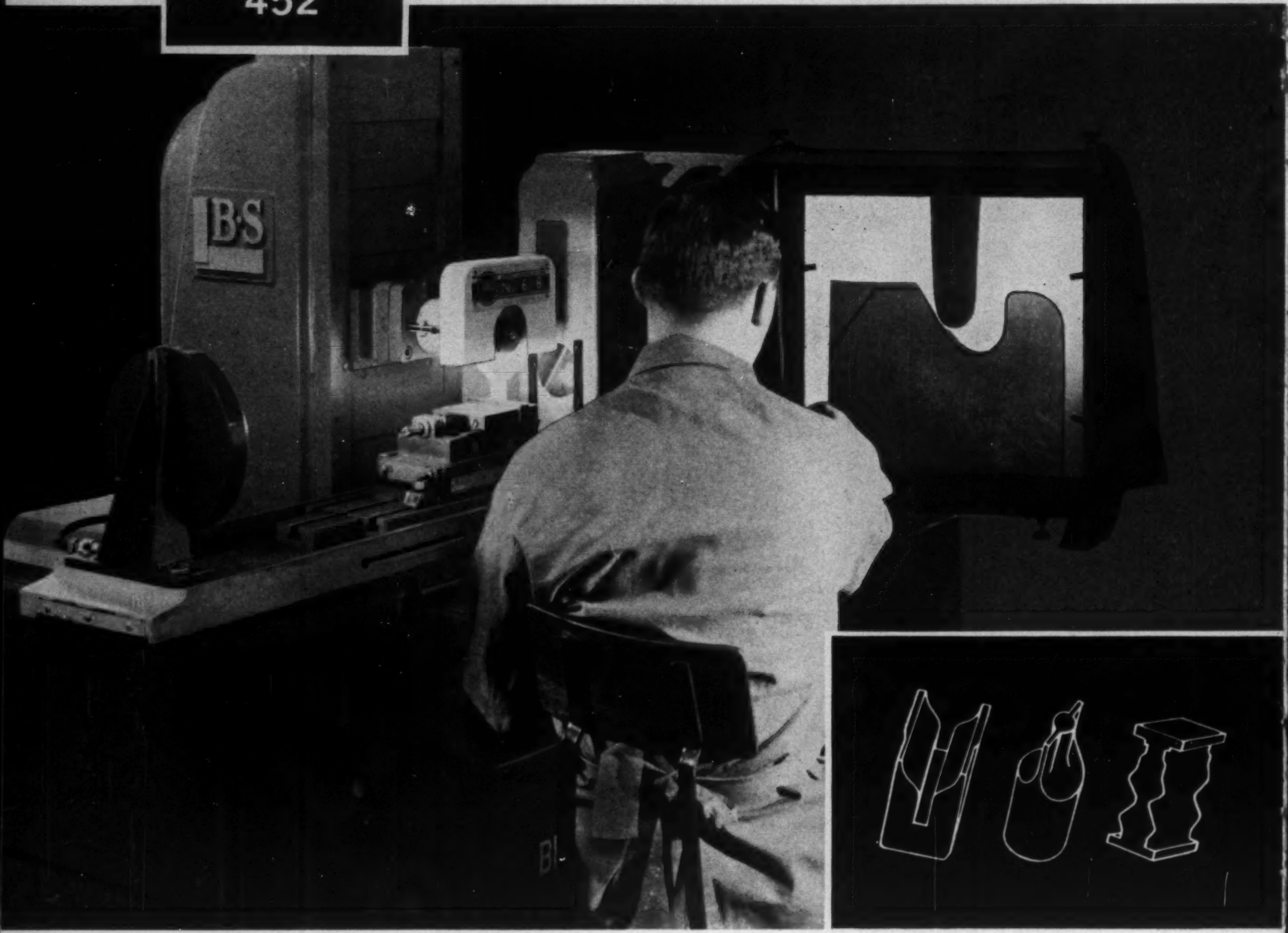
Manually operated Model A B&S Turret Drilling Machines and Positioning Tables provide jig-less drilling at low cost.

Brown & Sharpe PRECISION CENTER

MMT=pE

See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS



Up to 300% faster form grinding in carbide, ceramics – Brown & Sharpe MICROMASTER with VISUAL GRIND

VISUAL GRIND, the built-in comparator on the B&S 618 Surface Grinding Machine, permits tool and die makers to meet today's demand for intricate shapes in super-hard materials with spectacular savings in work hours and wheel costs.

Skilled operators can save up to 300% in set-up and grinding time. There is no need to remove work for frequent inspection with separate equipment. Semi-skilled workers, also, quickly learn to "follow the line," and match the clearly visible, true image of the work to the form layout drawn on the screen. Wheel costs are drastically reduced in grinding carbide and ceramics — any contours can be reproduced with a few simple wheels.

An unlimited variety of forms can be produced in punches, dies, and similar work — with through, blind, or template grinding — using standard equipment and simple attachments.

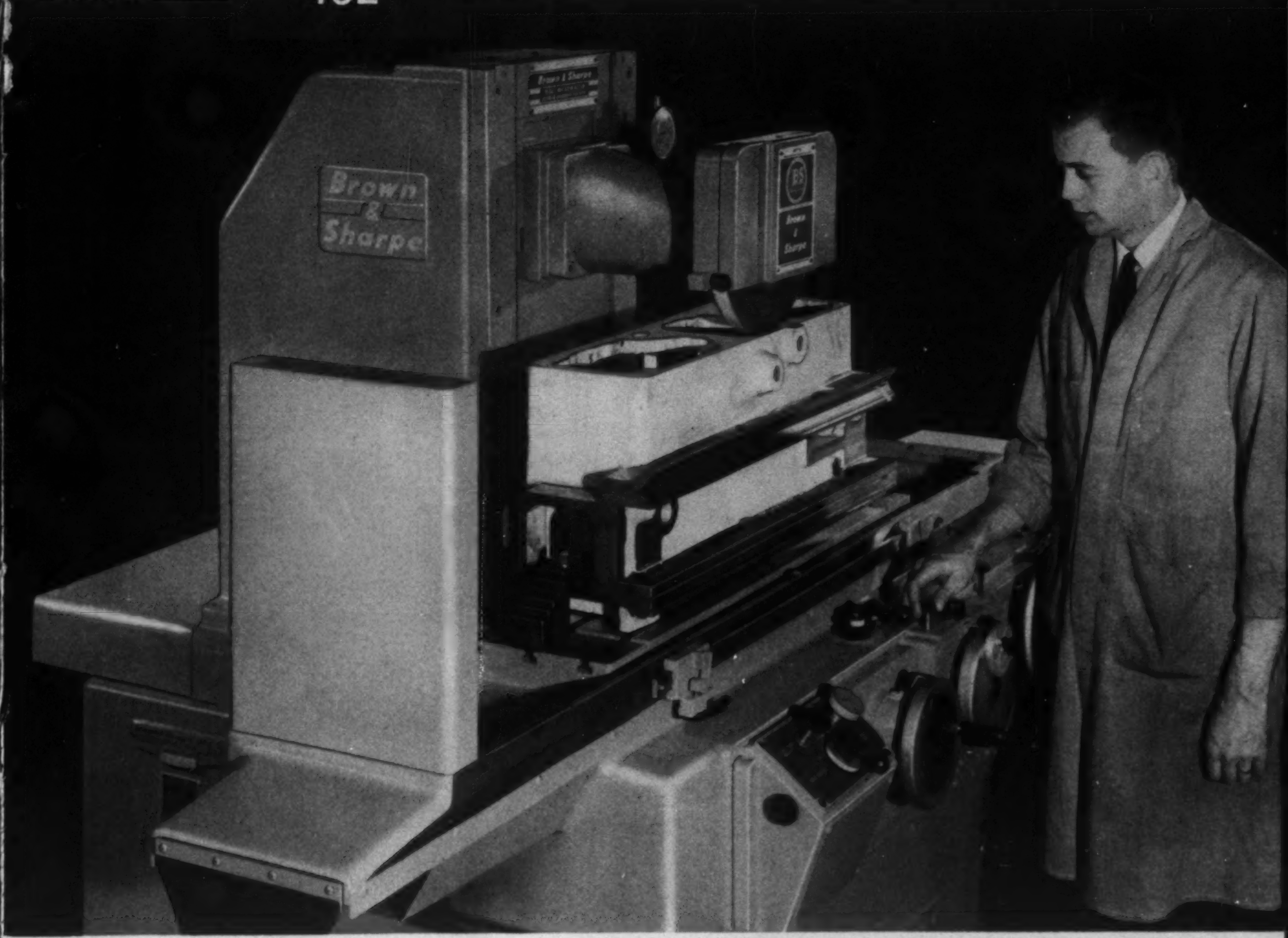
The MICROMASTER® with Visual Grind provides all the extra profit-saving advantages of the new B&S 618 Surface Grinder. It can be readily used for other grinding, of surfaces up to 6″ x 14″, without disturbing the optical system.

THE VISUAL GRIND® system is manufactured by The Cleveland Grinding Machine Co. and is sold only by Brown & Sharpe. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

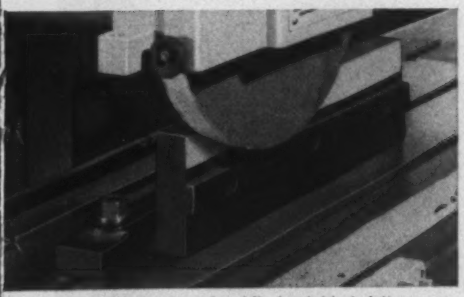
See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS



New Brown & Sharpe 1030 MICROMASTER Surface Grinding Machine

New B&S 824, 1024 and 1030 MICROMASTERS give outstanding surface grinding performance



Elimination of saddle (no table twist) assures accurate grinding of parallel, vertical surfaces.

Ever since the introduction of the 618 MICROMASTER, demand has steadily increased for larger capacity B&S Surface Grinders with the same profit-saving, super-precision performance. Now they are ready — in 8″ x 24″, 10″ x 24″, and 10″ x 30″ sizes, all with full hydraulic control. You can see them in action at Booth 452.

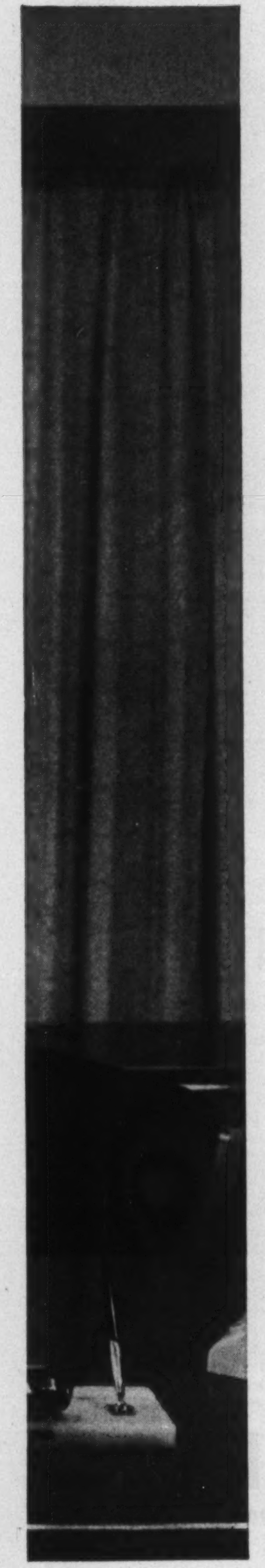
As with the 618 MICROMASTER, you can order these new machines with a wide range of optional and additional equipment or factory-modification to provide the exact equipment required for your specific grinding needs.

Also at the Brown & Sharpe Booth, you'll see machines that make production grinding to millionths a commonplace achievement of average operators.

Stop in and get full information, or write: Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.

Brown & Sharpe PRECISION CENTER

THE AMPLEXOLOGIST



The Amplexologist occasionally gets more than he bargained for. But that's not bad. It's good. In fact, it's like hitting the jackpot on the 123rd try.

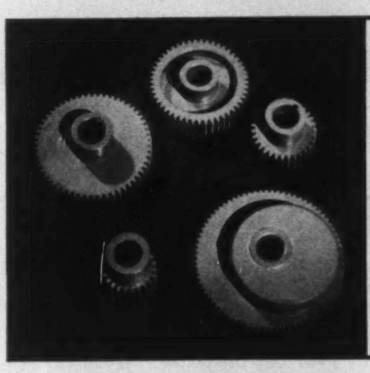
Why? Well, the Amplexologist has convinced any number of manufacturers that a few of the parts in their products can be made better and cheaper by eliminating machining costs through advanced powder metallurgy (i.e. Amplexology).

Strange to say, however, many of these same manufacturers are often hesitant about exploring the broad application of powder metallurgy to their product. Well, it takes time. But sooner or later most of them take the plunge:

> *O.K., Genius. Let's see how good you really are. Take all the prints for our new models. Check every one. Then you tell us how many parts can be made out of powder metal. And how much they'll cost.*

You see? Jackpot. And not just for the Amplexologist. For the manufacturer, too. A cost saving jackpot . . . because he's starting when designs are still flexible to take full advantage of powder metallurgy.

Challenges like this ("*You tell us . . .*") pay off for manufacturers and for us. They have in fact, helped make us the world's largest and most experienced producer of powder metal parts. Another reason why leading manufacturers say: **When it comes to powder metallurgy —Amplex has the answer.**



"You tell us . . ."

The parts shown are a new gear train: driver gear, high and intermediate speed driven gears, low speed gear, pinion gear. These five parts plus ten more were selected by the Amplexologist—who was called in at the design stage—for powder metal production. All are finished precision parts which require no machining (except the helical gear). Estimated savings on the gear train, 86%.

AMPLEXOLOGIST

SEND COUPON . . . **if you'd like to talk over your product with the Amplexologist. Don't hesitate. He's always happy to get out of the office.**

AMPLEX DIVISION • CHRYSLER CORP. • Dept. I-8
P.O. Box 2718 • DETROIT 31, MICH.

Please have the Amplexologist call to look into the possibility of using powder metal parts in our product.

NAME____________________

COMPANY____________________

ADDRESS____________________

CITY______________**STATE**__________

PRODUCT____________________

AMPLEX

DIVISION
CHRYSLER
CORP.

A CHRYSLER
OILITE
PRODUCT

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO
for Better Values

Allison
CUTTING WHEEL
TA301 R6 B4A

How Allison Wheels help you get

Quick, accurate cuts on almost any material or shape

• Abrasive cutting can give you *cleaner* cuts, *faster*—on almost any material from titanium to fire brick. But only when you use the proper cut-off wheel can you get the best results. That's where your ALLISON-CAMPBELL Field Engineer can help. Show him your cut-off problem, and he can select the ALLISON wheel that will cut your metals and other hard materials at speeds of just a few seconds per square inch—fine finish, without burn and with little or no burr—accuracy within close tolerances.

No matter what cut-off problem you have, chances are the right ALLISON wheel will do the job more quickly, less expensively, and more accurately than any other cut-off method. There's a complete selection of ALLISON wheels for every abrasive cutting application.

• • •

Resinoid bonded wheels are designed specifically for dry abrasive cutting machines. They cut at rates of 3 to 5 seconds per square inch, will cut 2" x 2" hardened steel on a standard chop stroke machine in 16 seconds.

Rubber bonded wheels are used primarily for wet cutting operations to obtain the finest quality cuts on all types of steel, alloys, titanium, glass, and plastics. Rubber bonded wheels are sometimes used for cutting tubing dry with minimum burr.

Masonry cutting blades, including reinforced types, are available for both wet and dry cutting of such materials as fire brick, concrete block, glazed tile, and transite. Use of the proper ALLISON wheel can reduce down-time for furnace repairs by speeding the installation of refractory brick.

Fiberglass reinforced wheels provide high cutting speeds while giving extra strength for many foundry cutting jobs. They're available in both resinoid and rubber bonded types, help prevent accidents and costly breakage.

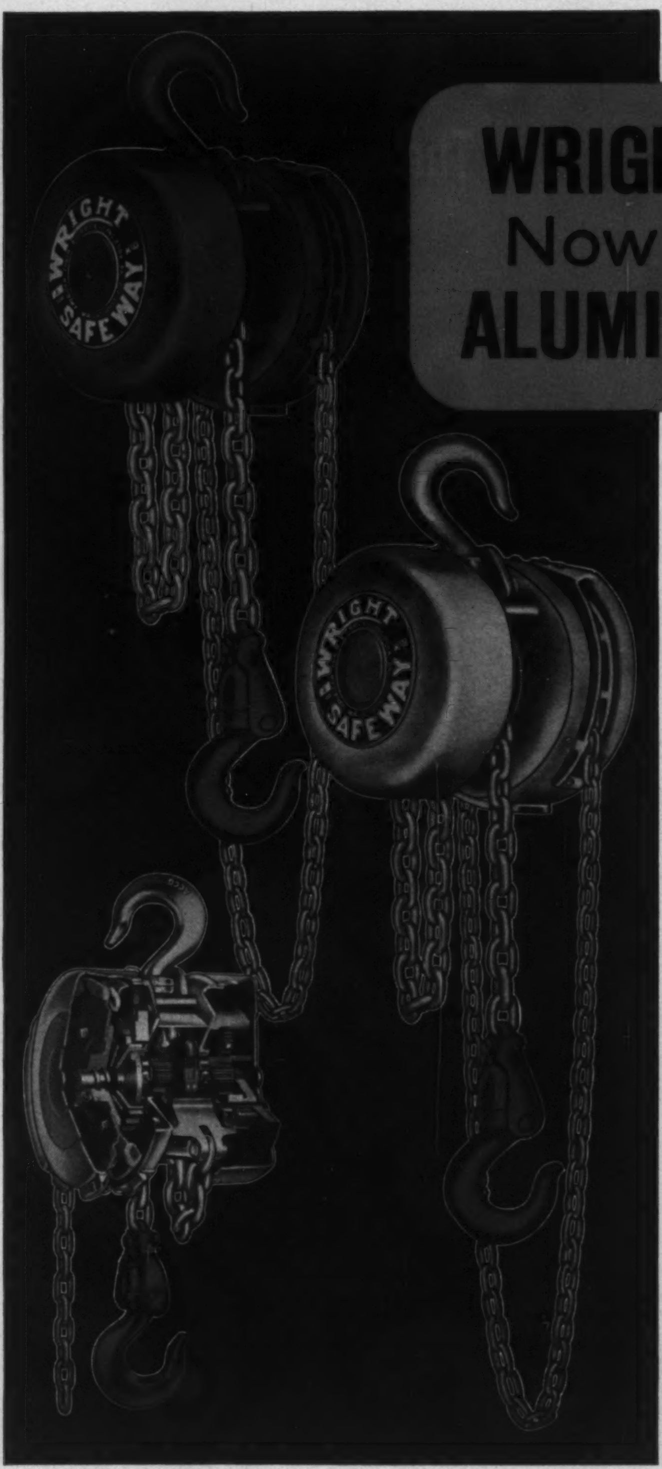
GET THE COMPLETE STORY! Write for **Bulletin DH-214** for detailed information on abrasive cutting techniques, and the wide selection of ALLISON wheel specifications. ALLISON wheels are available 3" to 34" diameter, .006" to 3/16" thick. And remember—your ALLISON-CAMPBELL Field Engineer can give you specialized help. His know-how is your assurance of the efficient, accurate, and economical cutting you can expect from modern abrasive cutting techniques.

ACCO ALLISON ABRASIVE CUTTING WHEELS

TRADE MARK

Allison-Campbell Division • American Chain & Cable Company, Inc.
927 Connecticut Avenue, Bridgeport 2, Conn.

WRIGHT SAFEWAYS
Now Available in
ALUMINUM or STEEL



• Take the finest hand hoist ever made for simplicity of design and sturdiness of construction...add to it new external and internal parts of aluminum...and you have the WRIGHT Aluminum Safeway Hand Hoist. This hoist is made lighter and more easily portable, yet retains all the advantages of the original Safeway design. It features load-bearing parts of strong, shock-resistant steel. Aluminum replaces the heavy steel covers, chain guide and hand chain.

It is a self-lubricating hoist which keeps load chain, load wheel and gear train operating smoothly at all times. Gear train is enclosed in grease-tight chamber and stays lubricated for life. Load chain and load wheel are lubricated by wick-type oiler fed from refillable reservoir.

Two factory tests certify the accuracy, workmanship and rated load-carrying capacities of these new aluminum hoists. Every foot of load chain is proof-tested and every completed hoist is tested at 50% above rated capacity.

Available now in six models in a capacity range of ½ to 4 tons, WRIGHT Aluminum Safeway Hand Hoists offer these outstanding features:

GEAR TRAIN • Planetary system using modified involute stub tooth gear form with all gear teeth generated from solid steel blanks.

LOAD BRAKE • Weston type with uniform composition lining and silent pawl.

LOAD WHEEL • Ferrous alloy, reversible, with accurately formed pockets.

LOAD CHAIN • Electrically welded, has maximum wear resistance and ability to withstand extreme impact.

LOAD CHAIN GUIDE • Guides chain into load wheel and shrouds load sheave, protecting parts from falling dust.

BOTTOM HOOK • Nickel-chrome-molybdenum alloy steel. Rocks and swivels. Operates on a Timken thrust bearing.

Contact Your
WRIGHT DISTRIBUTOR

Or write our York, Pa., office for DH-164 and DH-345 which give complete information about WRIGHT Safeway Hand Hoists made from aluminum and steel. Find out the advantages they offer you.

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York,
Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

The Aluminum Man*...

* Twelve years a champion of the finest metals for industry, Robert F. Messersmith—Alcoa Distributor Salesman for Corey Steel Co., Chicago, Ill.—is another of the men who make service to industry their careers, through knowledge of aluminum.

He helps cut your pipe and tube costs 3 ways

1—LOWER FIRST COST. With aluminum, you get *three times more footage per pound* than with standard heavyweight metals.

2—LOWER INSTALLATION COST. Standard alloys can be easily welded, threaded or mechanically coupled. And aluminum's light weight always means easier, faster handling.

3—LOWER MAINTENANCE COST. Aluminum needs no costly paint jobs to protect it against the weather, most atmospheres and many fluids and gases that attack other metals.

The Aluminum Man can give immediate "from-stock" delivery of the most commonly used sizes and alloys. Check with him for specification and technical data and how best to use *Alcoa® Aluminum*. Aluminum Company of America, 926-H Alcoa Building, Pittsburgh 19, Pa.

Call The Aluminum Man... he's your local Alcoa Distributor Salesman for aluminum sheet and plate, wire, rod and bar, extruded shapes and all Alcoa Mill Products.

ALCOA ALUMINUM

DISTRIBUTED NATIONALLY...
TO BETTER SERVE YOUR IMMEDIATE NEEDS

ALABAMA
Birmingham 5
*Hinkle Supply Co., Inc.
(Fairfax 2-4541)
Birmingham 1
The J. M. Tull Metal & Supply Co., Inc.
(Fairfax 3-1612)

ARIZONA
Phoenix
Ducommun Metals & Supply Co.
(Bridge 5-4471)
Pacific Metals Co., Ltd.
(ALpine 8-7821)

CALIFORNIA
Berkeley 10
Ducommun Metals & Supply Co.
(Thornwall 1-1820)
Los Angeles 54
*Ducommun Metals & Supply Co.
(Ludlow 8-0161)
Los Angeles 22
*Pacific Metals Co., Ltd.
(Raymond 3-5431)
Tubesales (Tube and Pipe)
(Raymond 3-7781)
San Diego
Ducommun Metals & Supply Co.
(Gridley 7-3141)
Pacific Metals Co., Ltd.
(BELmont 4-3253)
San Francisco 7
*Pacific Metals Co., Ltd.
(Underhill 3-5600)

COLORADO
Denver 16
Marsh Steel & Aluminum Co.
(Keystone 4-1241)
Denver 16
Metal Goods Corp. (Dudley 8-4141)

CONNECTICUT
Milford
*Edgcomb Steel of New England, Inc.
(Trinity 4-1631)
Windsor
Whitehead Metals, Inc.
(Murdock 8-4921)

FLORIDA
Jacksonville 5
The J. M. Tull Metal & Supply Co., Inc.
(Evergreen 7-5561)
Miami
The J. M. Tull Metal & Supply Co., Inc.
(Oxford 6-0150)
Tampa 10
The J. M. Tull Metal & Supply Co., Inc.
(3-6741)

GEORGIA
Atlanta 2
*The J. M. Tull Metal & Supply Co., Inc.
(Jackson 5-3871)

HAWAII
Honolulu 14
Aluminum Products Hawaii, Ltd.
(94-861)

IDAHO
Boise
Pacific Metal Co. (3-6468)

*Home Office

ILLINOIS
Chicago 80
*Central Steel and Wire Co.
(Republic 7-3000)
*The Corey Steel Co. (Bishop 2-3000)
Chicago 23
*Steel Sales Corporation
(Bishop 7-7700)

INDIANA
Indianapolis 18
Steel Sales Co. of Indiana, Inc.
(Liberty 6-1535)

KANSAS
Wichita
Marsh Steel & Aluminum Co.
(Whitehall 2-3231)
Wichita 16
Metal Goods Corp. (LYric 1-3451)

KENTUCKY
Louisville 3
Williams and Company, Inc.
(Juniper 3-7781)

LOUISIANA
New Orleans 12
Metal Goods Corp. (Jackson 2-7373)

MARYLAND
Baltimore 5
Whitehead Metals, Inc.
(Eastern 7-3200)

MASSACHUSETTS
Cambridge 39
Whitehead Metals, Inc.
(Trowbridge 6-4680)
Roxbury
Eastern Metal Mill Products Co.
(Highlands 2-5900)

MICHIGAN
Detroit 12
Central Steel and Wire Co.
(Twinbrook 2-3200)
Detroit (Hazel Park)
Meier Brass & Aluminum Co.
(Jordan 6-3902)
Detroit 10
Steel Sales Co. of Michigan
(Tyler 6-3000)

MINNESOTA
Minneapolis 13
Steel Sales Co. of Minnesota
(Sterling 1-4893)

MISSOURI
North Kansas City 16
*Marsh Steel & Aluminum Co.
(Grand 1-3505)
Metal Goods Corp. (Grand 1-3516)
St. Louis 14
*Metal Goods Corp. (Harrison 7-1234)
St. Louis 10
Steel Sales Co. of Missouri, Inc.
(Prospect 1-5255)

NEW HAMPSHIRE
Nashua
*Edgcomb Steel of New England, Inc.
(Tuxedo 3-7731)

NEW JERSEY
Elizabeth
Adam Metal Supply of New Jersey
(Flanders 1-2550)
Harrison
Whitehead Metals, Inc.
(Humbolt 5-5900)
Hillside
Miller Steel Company, Inc.
(Waverly 6-6000)
Kenilworth
Jones & Laughlin Steel Corp.
Strip Steel Division
(Murdock 6-6900)

NEW YORK
Albany 1
*Eastern Metals Warehouse, Inc.
(IV-3281)
Buffalo 17
Brace-Mueller-Huntley, Inc.
(Victoria 8700)
Buffalo 7
Whitehead Metals, Inc.
(Bedford 3100)
New York (Long Island City 1)
*Adam Metal Supply, Inc.
(Stilwell 6-7737)
New York (Brooklyn)
Strahs Aluminum Co., Inc.
(Browning 2-7000)
New York 14
*Whitehead Metals, Inc.
(Watkins 4-1500)
Rochester 1
Brace-Mueller-Huntley, Inc.
(Congress 6-6560)
Rochester 10
Whitehead Metals, Inc.
(BUtler 8-2141)
Syracuse 1
*Brace-Mueller-Huntley, Inc.
(Howard 3-3341)
Syracuse 4
Whitehead Metals Inc.
(Howard 3-6241)

NORTH CAROLINA
Charlotte 6
Edgcomb Steel Co. (Franklin 5-3361)
Greensboro
Edgcomb Steel Co. (Broadway 5-8421)

OHIO
Cincinnati 14
Central Steel and Wire Co.
(Avon 1-2230)
Cincinnati 37
Williams and Company, Inc.
(Capitol 1-3000)
Cleveland 2
*A. M. Castle & Co.
4510 Division Avenue
(Atlantic 1-5100)
Cleveland 14
Williams and Company, Inc.
(Utah 1-5000)
Columbus 12
Williams and Company, Inc.
(Axminster 4-1623)
Toledo 12
Williams and Company, Inc.
(Greenwood 5-8661)

OKLAHOMA
Tulsa 13
Metal Goods Corp. (Temple 6-2561)

OREGON
Portland 9
*Pacific Metal Co. (Capitol 7-0693)

PENNSYLVANIA
Philadelphia 34
*Edgcomb Steel Co. (Garfield 3-6300)
Philadelphia 33
Metal Supply Co. (Center 6-0220)
Philadelphia 40
Whitehead Metals, Inc.
(Baldwin 9-2323)
Pittsburgh 33
*Williams and Company, Inc.
(Cedar 1-8600)
York
Edgcomb Steel Co. (47-1411)

RHODE ISLAND
Slatersville
Edgcomb Steel of New England, Inc.
(Poplar 7-0900)

SOUTH CAROLINA
Greenville
The J. M. Tull Metal & Supply Co., Inc.
(Cedar 3-8366)

TENNESSEE
Memphis 6
Metal Goods Corp. (Whitehall 8-3407)

TEXAS
Dallas 35
Metal Goods Corp. (Fleetwood 1-3271)
Houston 1
Metal Goods Corp. (Riverside 7-1110)

UTAH
Salt Lake City 1
Pacific Metals Co., Ltd. (Davis 2-3461)

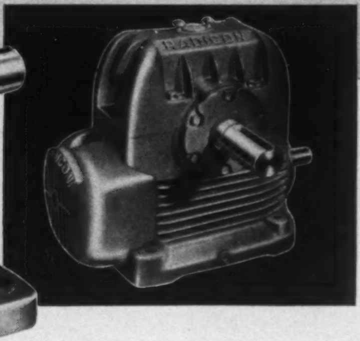
WASHINGTON
Seattle 8
Ducommun Metals & Supply Co.
(Parkway 5-1500)
Seattle 4
Pacific Metal Co. (Main 2-6925)

WISCONSIN
Milwaukee 1
Central Steel and Wire Co.
(Humboldt 1-5000)
Milwaukee 9
Steel Sales Co. of Wisconsin
(Hilltop 2-2020)

FOOTE BROS. introduces a

FAN-COOLED

- **High load carrying capacity**
- **Super-efficient 2-way cooling for higher thermal ratings**
- **Unlimited mounting positions**
- **Automatic and positive lubrication**
- **IN STOCK for immediate delivery**



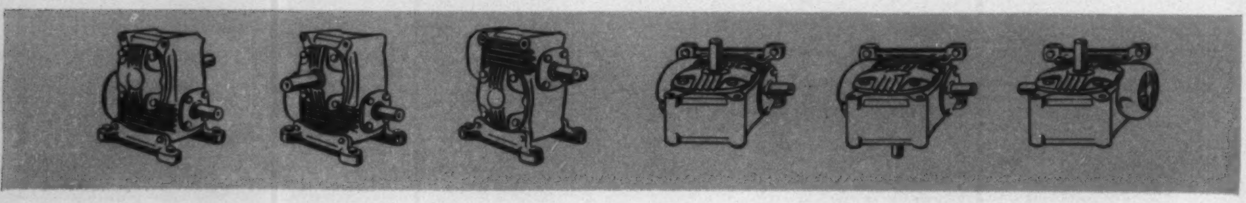
- **12 sizes—Center Distances from 1⅛" to 8"**
- **Rated to NEW AGMA Standards**
- **Ratios from 5:1 to 70:1**
- **Output torque to 46,000 lb. in.**
- **Input capacities from .01 to 66 HP**

Foote Bros. RADICON Worm Gear Reducers incorporate *totally new* concepts of speed reducer design and construction. From the inside out and top to bottom, they embody years ahead thinking to provide users with more efficient, more versatile right angle power transmission in minimum size units.

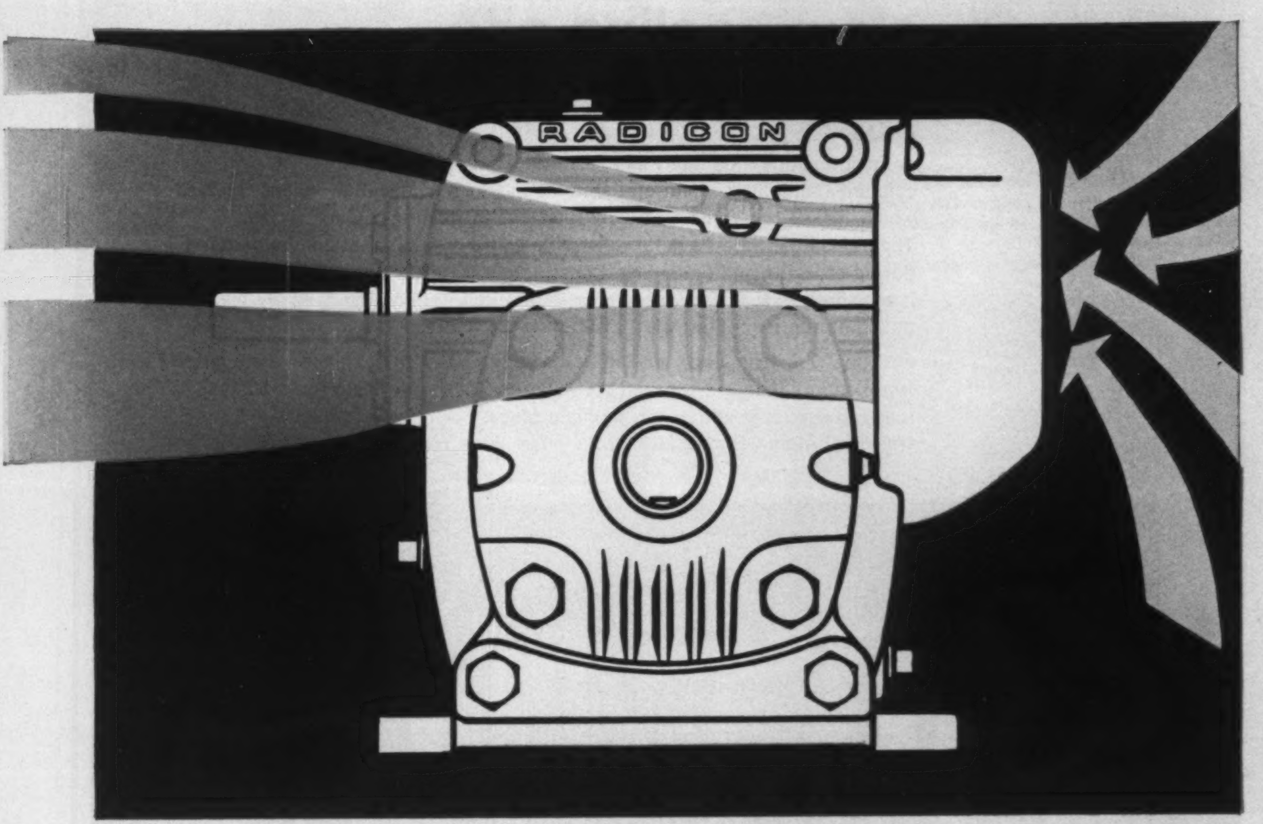
Gear accuracy and surface finish, bearing and shaft design, positive lubrication, extreme efficiency controlled cooling, the selection of materials and precision manufacturing techniques—all reflect careful attention to detail that results in higher load carrying capacity and maximum service life.

These outstanding new fan-cooled worm gear reducers are available now—carried IN STOCK by Authorized Foote Bros. Distributors for IMMEDIATE DELIVERY. See them soon. Get complete details on the performance, versatility, and service life they will bring you. Write for RADICON Catalog.

UNLIMITED MOUNTING POSITIONS



COMPLETELY NEW and ADVANCED line of WORM GEAR REDUCERS



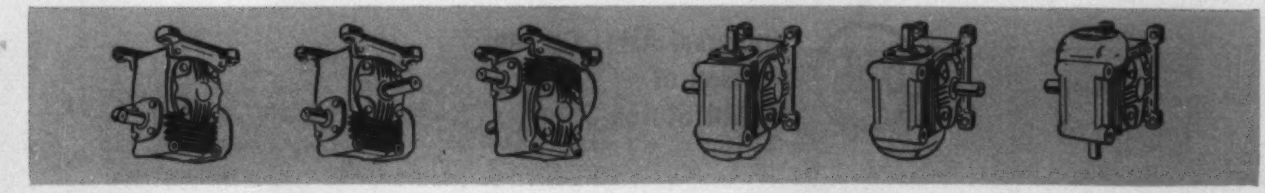
RADICON Reducers operate in a STREAM OF AIR for maximum thermal efficiency

Advanced design of RADICON Worm Gear Reducers and their high efficiency radiation and convection cooling for controlled transfer of heat to the outside air, permit *identical* thermal and mechanical ratings in most cases. For infrequent or intermittent service, thermal ratings can be ignored.

A moving stream of air, induced by the maximum diameter fan, forcing high velocity cooling air along horizontal channels formed by the external ribbing, dissipates radiated heat to hold the Reducer's temperature rise to a minimum. Cooling is equally efficient at any mounting position.

FOOTE BROS. **GEAR AND MACHINE CORPORATION**
4565 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES



USS
Atlas
Lumnite

Since 1945...

not a cent to maintain refractory concrete slow-cooling pits

For fifteen years these slow-cooling pits have been absorbing sudden thermal shocks as red-hot railroad axles are lowered into them. And with no maintenance required! Pits like these, constructed with LUMNITE calcium-aluminate cement and suitable aggregates, have low volume change which makes the concrete highly resistant to heating-cooling cycles. The monolithic walls have no vulnerable edges or joints that can be battered during charging and unloading. Construction of refractory concrete pits is economical, too. No skilled labor is required; reinforcing is easily built in; and concrete reaches service strength in 24 hours.

For greater convenience, castables containing LUMNITE cement are available from leading manufacturers of refractories. These are packaged mixtures, ready to use. Just add water, mix and place. For information write Universal Atlas Cement, 100 Park Avenue, New York 17, N. Y.

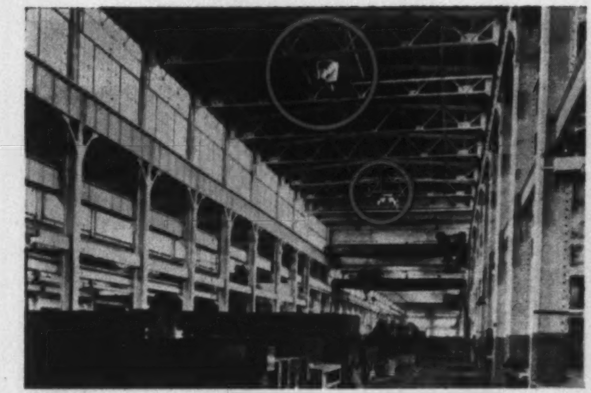
Nine of these slow-cooling pits, constructed with LUMNITE cement, have established service records at the Wheel and Axle Division of U. S. Steel's Homestead District Works. Pits measure 14'x14'x6' inside; walls taper 12" to 20" thick, top to bottom. Built by Rust Furnace Co., Pittsburgh.

Universal Atlas Cement
Division of
United States Steel

L-212

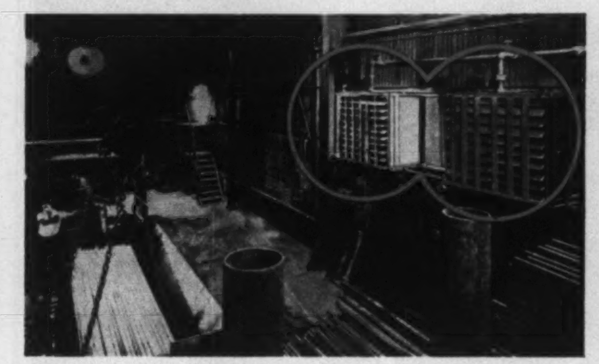
"USS," "Atlas" and "Lumnite" are registered trademarks

Offices: Albany . Birmingham . Boston . Chicago . Dayton . Kansas City . Milwaukee . Minneapolis . New York . Philadelphia . Pittsburgh . St. Louis . Waco

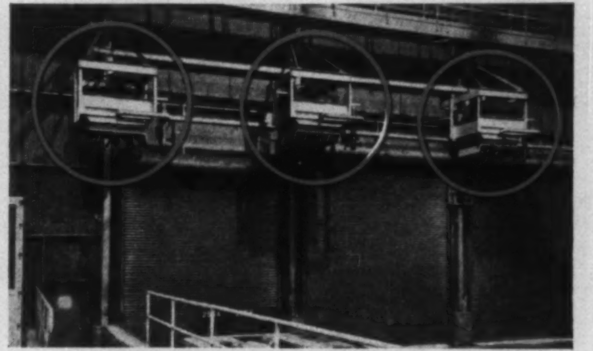


Wing Steam or Hot Water Revolving Unit Heaters operate efficiently from all mounting heights—distribute heat evenly and around obstacles—eliminate hot blasts and cold spots. Air is continuously on the move for greatest worker comfort.

Wing Gas-Fired Revolving Assemblies assure all the economies in installation and operation offered by gas fuel. Units use fuel only when and where heat is needed. Can be located safely above traveling cranes and other equipment.



Wing Fresh Air Supply Units draw outside air into building through roof or wall and heat it with steam, hot water or gas. Inside air is kept fresher, workers more productive. Efficient operation of exhaust systems and combustion equipment results from balanced air pressures.

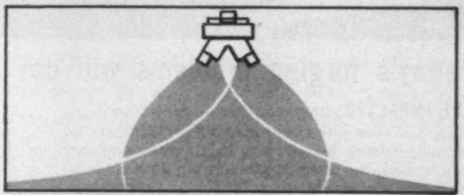


Wing High Velocity Door Heaters are the only ones specifically designed for blanketing opened railroad and truck doorways with a curtain of heated air. Desirable indoor temperatures are maintained for better, more healthful working conditions.

WING HEATERS solve metals industry heating problems

Wing heating equipment—Revolving Heaters, Fresh Air Supply Units, Door Heaters and other equipment—in many installations have proved their suitability in metals industry operation—steel plants, fabricators and warehouses. They are economical—because of greater coverage; fewer heaters are usually needed; heated air is recirculated; maintenance is low.

Write today for your copy of our new brochure, Wing Heaters in the Metals Industry, which will soon be off the press...or request bulletin for each type heater.



Drawing shows how Wing Revolving Heaters project warm air to floor level and distribute it to large areas. This not only assures a comfortable working atmosphere, but also provides maximum protection for stored metals against corrosion.

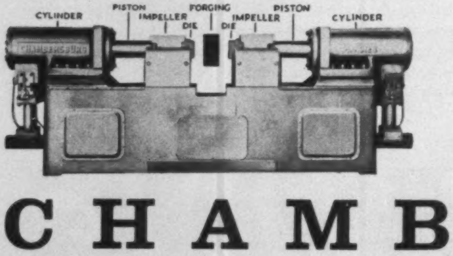
L. J. WING MFG. CO.
DIVISION OF AERO SUPPLY MFG. CO. INC.
195 VREELAND MILLS ROAD, LINDEN, NEW JERSEY
FACTORIES: LINDEN, N. J. AND MONTREAL, CANADA
IN EUROPE: WANSON, HAEN-NORD, BRUSSELS, BELGIUM

WING

Space Age Forging with the Chambersburg IMPACTER

Today's forging problems will not be solved with yesterday's forging equipment

THE IMPACTER: Designed and built by Chambersburg, pioneers in the development of machinery for forming metals by impact. In this revolutionary forging tool, the stock is struck from both sides by horizontally opposed rams. No shock, no vibration.



At the amazing new InFab project of Universal-Cyclops at Bridgeville, Pa., a Chambersburg Impacter is employed to forge ingots of molybdenum and other "exotic" metals in an atmosphere of pure argon gas, in which the workers have to wear space suits. The Impacter was selected primarily because of its instantaneous impact. At temperatures up to 4500° F, the Impacter strikes the ingot on two sides with 15,000 ft. lbs. of force; yet the impact is instantaneous and the transmission of heat to the die faces momentary. Other advantages are the Impacter's lack of shock or vibration, necessitating no heavy foundations, and the thorough working of the metal, deformation taking place equally on both sides. Learn more about this modern method of forging. Write today to Chambersburg Engineering Company, Chambersburg, Pa.

CHAMBERSBURG

DESIGNERS AND MANUFACTURERS OF THE IMPACTER

6,000

ways to get extra efficiency

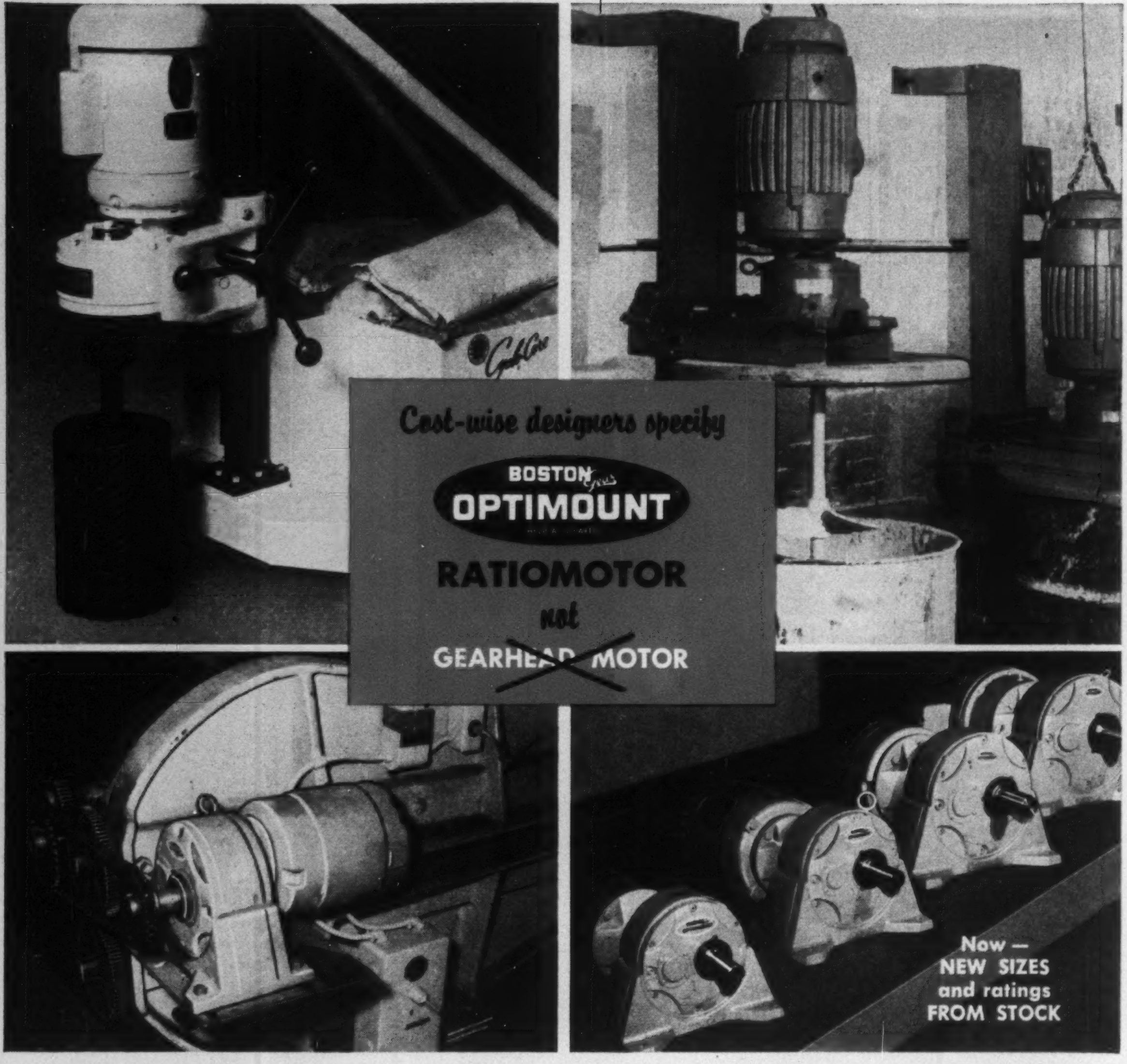
There are 6,000 different types of Nicholson and Black Diamond files. There's one that's precisely right for your operation . . . and the materials you file. • Using the correct file contributes to efficiency by reducing the amount of filing time. Time, not the file, represents the largest part of filing costs. • Nicholson and Black Diamond files pay off another way, too. Their high quality substantially reduces tool replacement costs. • We take infinite care to produce the highest quality files available. You'll find that your Industrial Distributor carries a complete selection under the Nicholson or Black Diamond brand. • The next time you need a file specify Nicholson or Black Diamond for standard or special purpose files . . . X. F. (Extra Fine) brand in Swiss Pattern. Ask your distributor's advice . . . he'll keep you informed on the various types best suited for your job. Ask him, too, about the newly improved line of Nicholson soft faced industrial hammers.

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

NICHOLSON U.S.A. **NICHOLSON** BLACK DIAMOND U.S.A. NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

FILES • ROTARY BURS • HACKSAW AND BAND SAW BLADES • GROUND FLAT STOCK • INDUSTRIAL HAMMERS

NICHOLSON
U.S.A.



Cost-wise designers specify

BOSTON Gear OPTIMOUNT

RATIOMOTOR

not

~~GEARHEAD MOTOR~~

Now — NEW SIZES and ratings FROM STOCK

This simple change in specifications starts savings all along the line

BOSTON Gear OPTIMOUNT helical-geared RATIOMOTORS offer a choice of 456 mounting combinations, available FROM STOCK — save you the extra cost and the wait for "specials." You design for highest efficiency, then a phone call to your local Distributor brings you the OPTIMOUNT you specify — ready to install. He can furnish any quantity, and supply them as needed. You avoid big inventory expense, save production time.

You can order OPTIMOUNT Ratiomotors horizontal or vertical base mounted — with a choice of many shaft positions in either base — for any floor, wall, or ceiling mounting position — with single or double reduction helical gearing — for ⅙ to 10 hp drives. You get any arrangement specified, ready to install.

Call your Distributor today for complete information. Boston Gear Works, 72 Hayward Street, Quincy 71, Massachusetts.

NEW PRODUCTS
BOSTON Gear
57
POWER TRANSMISSION PRODUCTS

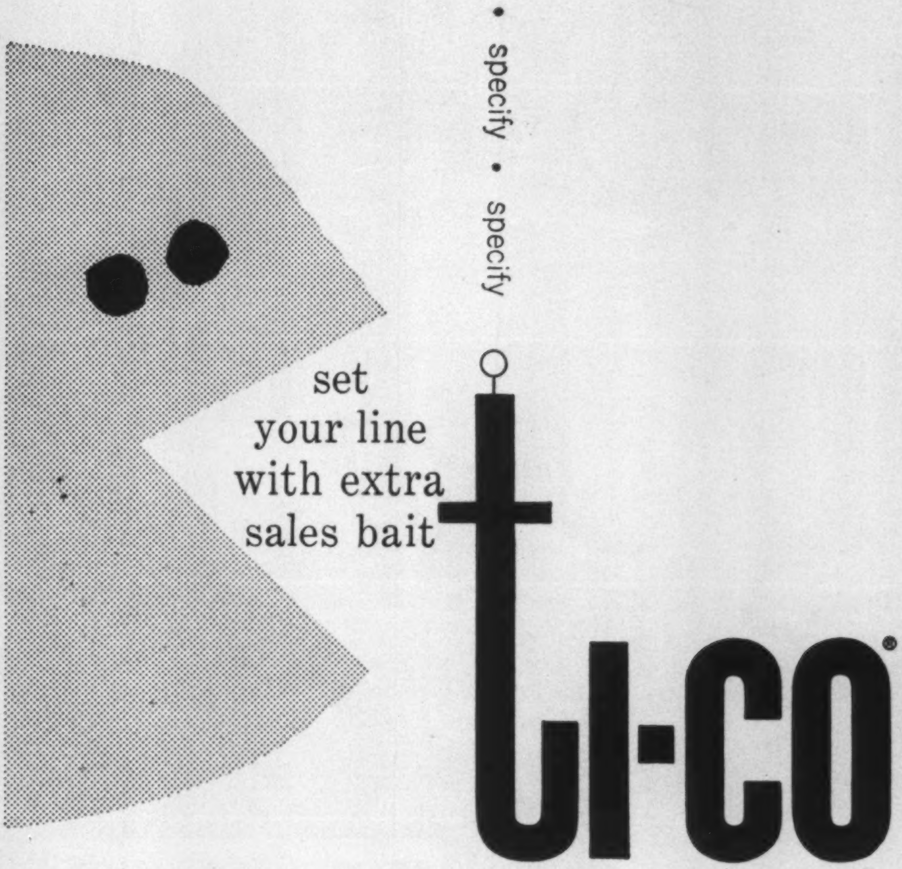
Ask Distributor for NEW PRODUCTS SUPPLEMENT to Catalog No. 57

See OPTIMOUNT at
BOSTON GEAR BOOTH NO. 1808
DESIGN ENGINEERING SHOW

CALL YOUR NEARBY BOSTON Gear® DISTRIBUTOR

For nearest Distributor look under "GEARS" in the 'Yellow Pages'

— STANDARDIZATION PAYS —



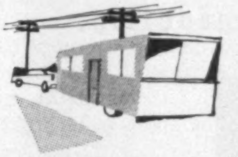
TI-CO® NON-FLAKING GALVANIZED SHEETS

for CORROSION RESISTANCE

Anywhere there's a corrosion problem . . . there's a place for INLAND TI-CO! More and more, makers of famous-name appliances, producers of farm equipment, manufacturers of thousands of products which must withstand moisture-laden atmospheres, in or out-of-doors, are recognizing non-flaking TI-CO as the standard of excellence in galvanized sheets. ■ TI-CO galvanized sheets keep your product components functioning longer and add years to the appearance of the finished product . . . giving consumers greater value and adding "sales bait" to your product line.

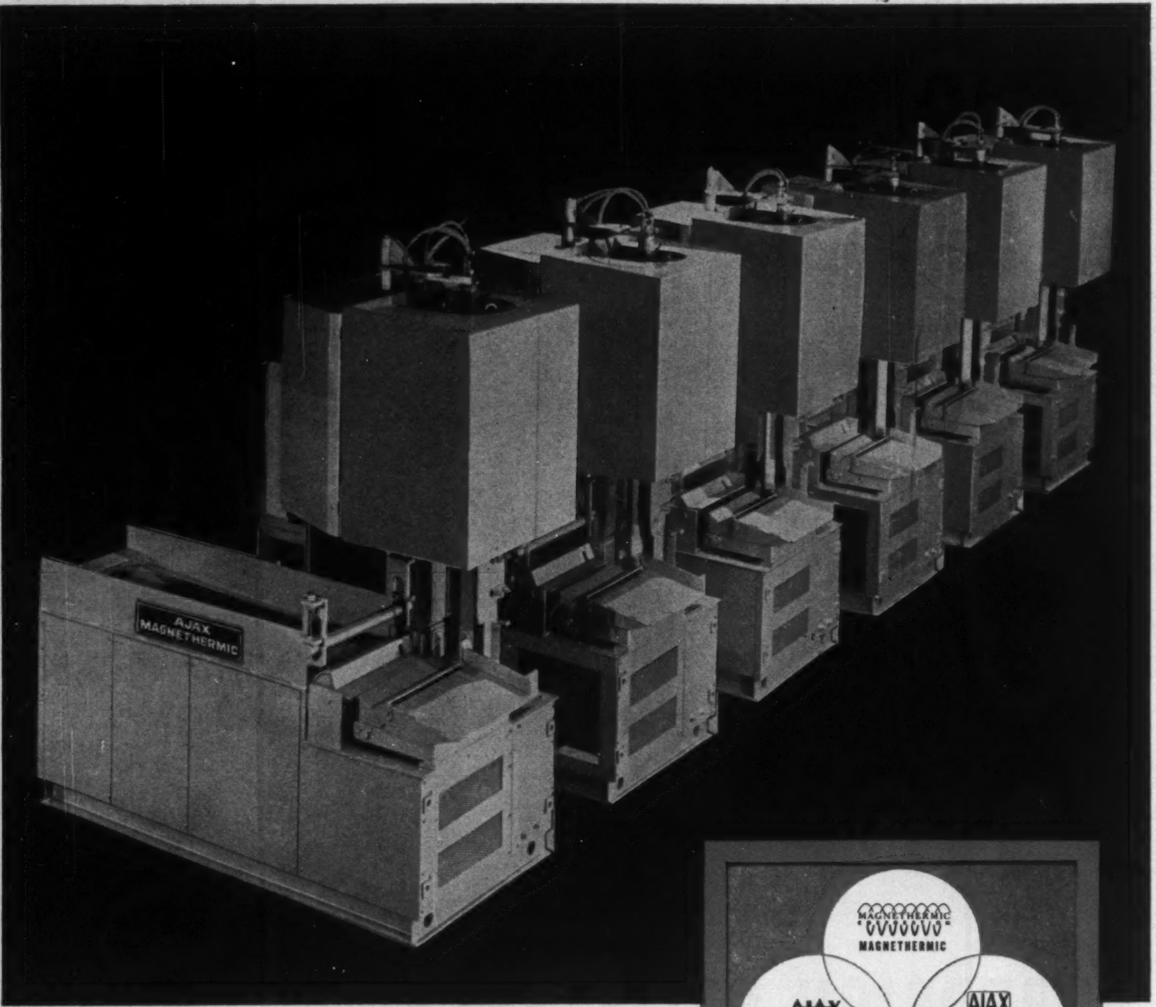
INLAND STEEL COMPANY **30 West Monroe Street • Chicago 3, Illinois** Sales Offices: *Chicago • Davenport • Detroit Houston • Indianapolis • Kansas City • Milwaukee • New York • St. Louis • St. Paul*

INLAND


TI-CO protects families, too, in modern house trailers. Thousands of these compact, mobile homes have roofs made of this non-flaking galvanized sheet.

Years of corrosion-resisting service are added to washers, dryers, refrigerators and other appliances whose parts are made of non-flaking TI-CO.

Poultry feeders and other farm equipment subjected to weather and abusive chemicals last longer when made of non-flaking TI-CO.



These six 400 KW vertical Billet Heaters heat stainless steel billets—5" —10" dia. x 28" long, to 2300° F at the rate of 12,000 lbs. per hour.

MAGNETHERMIC

AJAX ELECTROTHERMIC

AJAX USA

AJAX ENGINEERING

AJAX MAGNETHERMIC

WATCH AM

FOR THE NEW IDEAS IN HEATING AND MELTING BY INDUCTION

Vertical Steel Billet Heaters, one of many products of AM, for the heating or melting of metals by Induction.

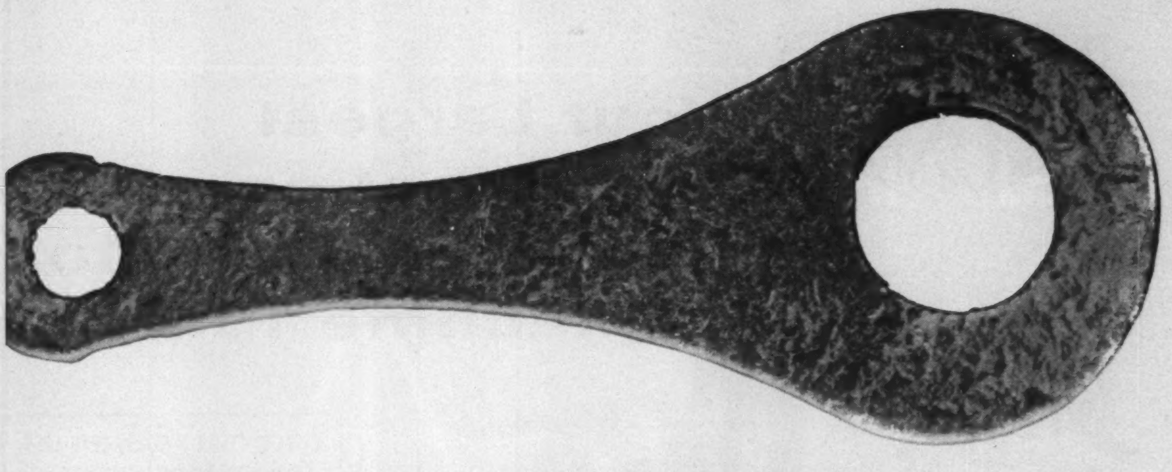
"induction heating is our only business"

Ajax Magnethermic CORPORATION

GENERAL OFFICES
P. O. BOX 839
Youngstown 1, Ohio

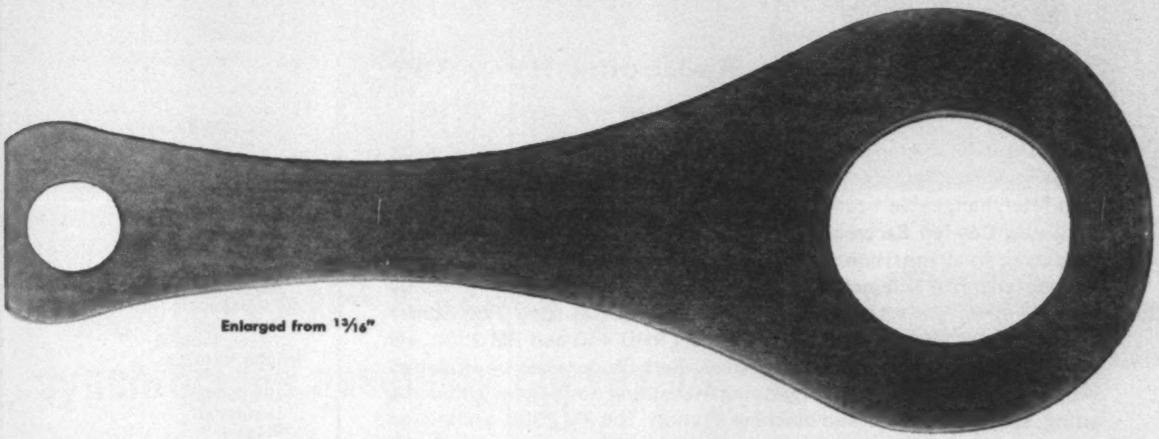
TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio



They're both strip products, but . . .

RIVERSIDE-ALLOY continuous casting can make the difference!



Enlarged from 13/16"

Profitable strip products or expensive rejects . . . the difference is *how* your alloy was cast. *Exclusive* Riverside-Alloy *continuous casting* methods produces the ideal metal . . . no impurities, no gas holes . . . but a dense, homogeneous casting, 100 per cent fault-free.

Result: Riverside-Alloy strip, rolled from Riverside-Alloy castings, is the finest you can buy . . . never a hidden defect to show up in thin gauges, under severe die forming.

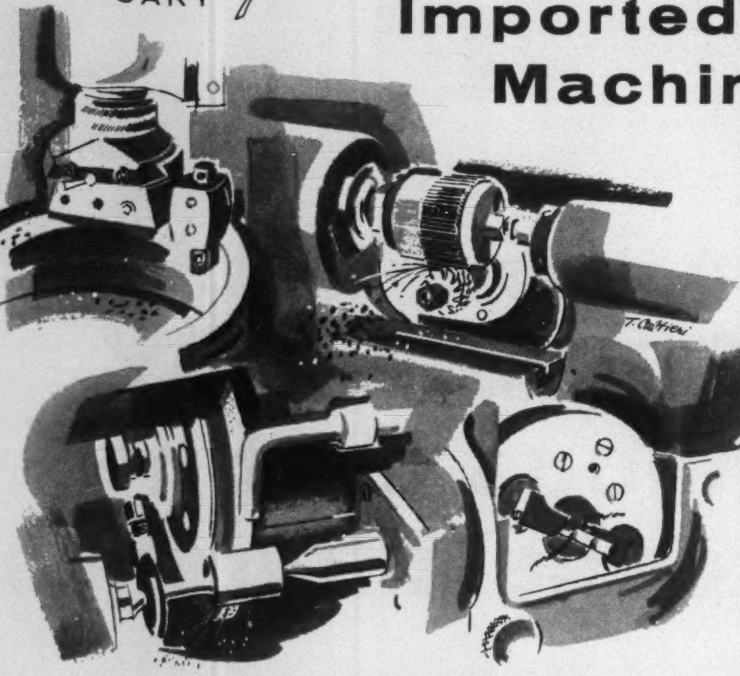
Next order, specify Riverside-Alloy . . . profit from the benefits of continuous casting . . . eliminate your reject problems. *Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.*

RIVERSIDE-ALLOY METAL DIVISION PORTER ***H. K. PORTER COMPANY, INC.***

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

20th
COSA
ANNIVERSARY

Your Largest Selection of Imported Precision Machine Tools



See them in operation—Booths 117 & 653
Coliseum Machinery Show—Sept. 7-15

Cosa will exhibit many of the latest designs in Precision Production Machine Tools. Featured in Booth 653, you will see a new **Deckel LK** with interchangeable heads for Jig Boring and Jig Grinding. There will be a new Coil-fed **Escomatic D-4** form-turning machine, automatically producing small precision parts—centered and drilled to reduce secondary operations. A **Schenck R06** Balancer, with autocycling, will precisely balance small parts revolving at 10,000 to 30,000 rpm. Two **Studer** Universal and Cylindrical Grinders, models RHU 450 and RM 250L, will grind parts to extremely close tolerances. Both Studers can be equipped with O.D. grinding and match grinding measuring devices for automatic sizing, spark-out control and machine shut-off. The RM 250L, a one-lever controlled grinder, is being shown for the first time in this country. A **Koepfer** Gear Hobber 170 for automatic production of various types of gears will also be demonstrated.

In Booth 117, two **Trumpf** Universal Sheet Metal Working Machines will demonstrate copy-nibbling, many curve cutting and forming operations.

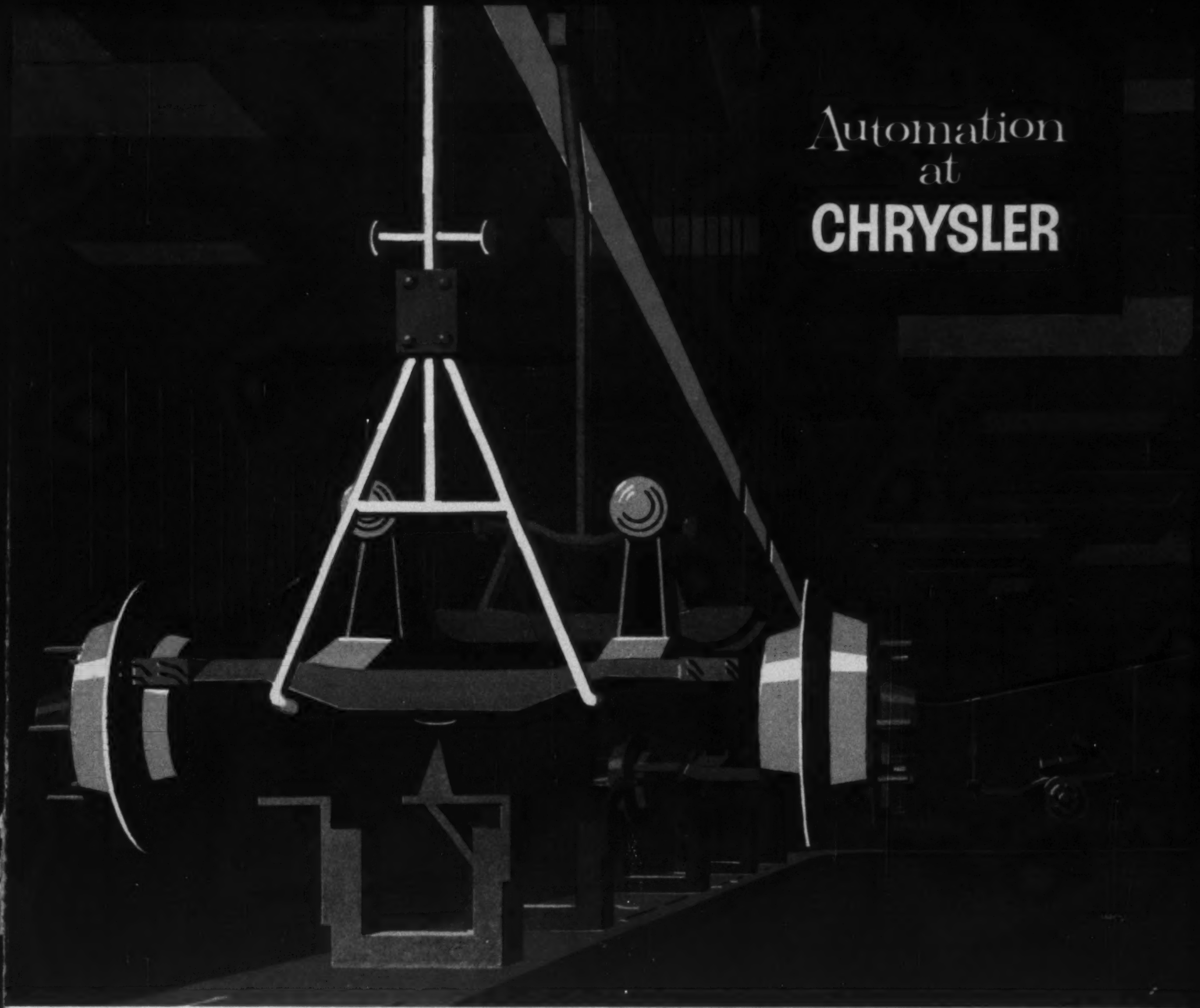
Expert technicians will demonstrate these machines and provide information on the entire Cosa line, listed at the right.

CHECK COSA'S COMPLETE LIST FOR YOUR TOOLING NEEDS

- Balancing Machines
- Bending and Forming Machines
- Boring Machines
  - Boring, Milling
  - Horizontal
  - Jig
  - Special
  - Vertical
- Chucking Machines
- Drilling Machines, Radial
- Dynamometers
- Engraving Machines
  - 2 & 3 Dimensional Pantograph
- Fatigue Testing Machines
- Flow Forming Machines
- Gear Checking and Testing Machines
- Gear Hobbers
- Grinding Machines
  - Cam & Contour
  - Centerless
  - Cylindrical, Plain
  - Internal
  - Jig
  - Profile
  - Surface
  - Tap, Tool & Cutter
  - Thread
  - Universal
- Jig Borers
- Lathes
  - Copy Turning
  - Double End
  - Facing
  - Roll Turning
  - Special
  - Spinning
  - Tracer
  - Turret, Vertical
- Milling Machines
  - Contour
  - Die Sinking
  - Horizontal
  - Planers
  - Profile
  - Skin
  - Special
  - Universal
  - Vertical
- Nibbling Machines
- Planers, Open Side
- Rack Cutters
- Roller Shears
- Screw Machines, Swiss, Coil-Fed
- Transfer Presses

COSA

Importers of Leading Precision Machine Tools
Nationwide Sales and Service
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.



VARIDYNE a/c drive system synchronizes assembly conveyors

Problem: Chrysler Corp., Dodge Division, new unitized body assembly lines required linkage of three *variable-speed, continuous motion* conveyors—stub frame overhead, main assembly pedestal and final assembly flattop. At transfer point, shown above, pin in conveyor must match hole in frame with no cumulative error.

Solution: U. S. VARIDYNE a/c Drive System with *LinkSync* control. Chrysler engineers working with U. S. Motors field engineers chose VARIDYNE over a d.c. system because: initial start-up is simplified; instantly synchronous without warm-up; needs no synchronizing readjustments; there is no cumulative error; and maximum reliability is assured by use of *standard a.c. motors.* VARIDYNE varies the frequency of a.c. current to these motors, converting them to adjustable speeds. *Write today for* VARIDYNE *Brochure F-1963.*

U.S. ELECTRICAL MOTORS INC.

P. O. Box 2058, Los Angeles, California or Milford, Connecticut

AT DEVLIEG BOOTH 431 • NMTBA EXPOSITION

new series

"Designated the model 'H,' our new Jigmil series provides greater range, is more rugged, easier to operate and more accurate."

"Available in spindle sizes ranging from 3″ to 5″, the new 3H, 4H and 5H machines greatly increase JIGMIL range for precision boring, milling, drilling and other operations. The new series introduces simplified controls, thermal control of main spindle bearings for increased accuracy . . . wider bed and table for added stability and working range . . . stainless steel way covers for positive protection . . . features that reach a new standard in JIGMIL accuracy, ruggedness and simplicity of operation. And like all JIGMILS, the 'H' series is available with the DeVlieg Diatrol direct dial dimensioning system or Tapac* —DeVlieg's own system of automatic tape control."

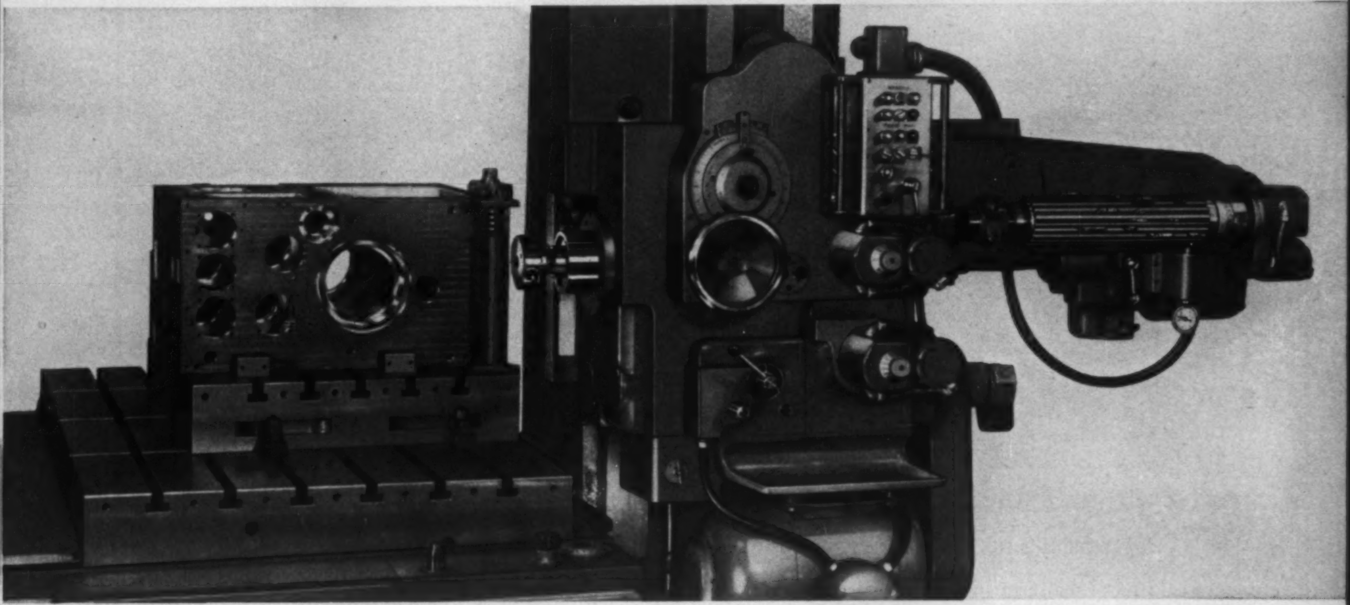
R. A. JERUE
Vice President in Charge of Engineering

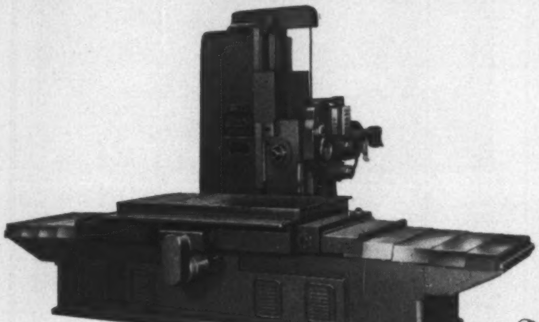
*Tape Automatic Positioning And Control

DEVLIEG MACHINE COMPANY, FAIR STREET • **ROYAL OAK, MICHIGAN**

"H" Jigmils®

with Duplitrol • Diatrol • Tapac





MMT-PE See new "H" series JIGMILS with DeVlieg Diatrol and DeVlieg Tapac in operation at the NMTBA Exposition, Chicago, September 6-16th.

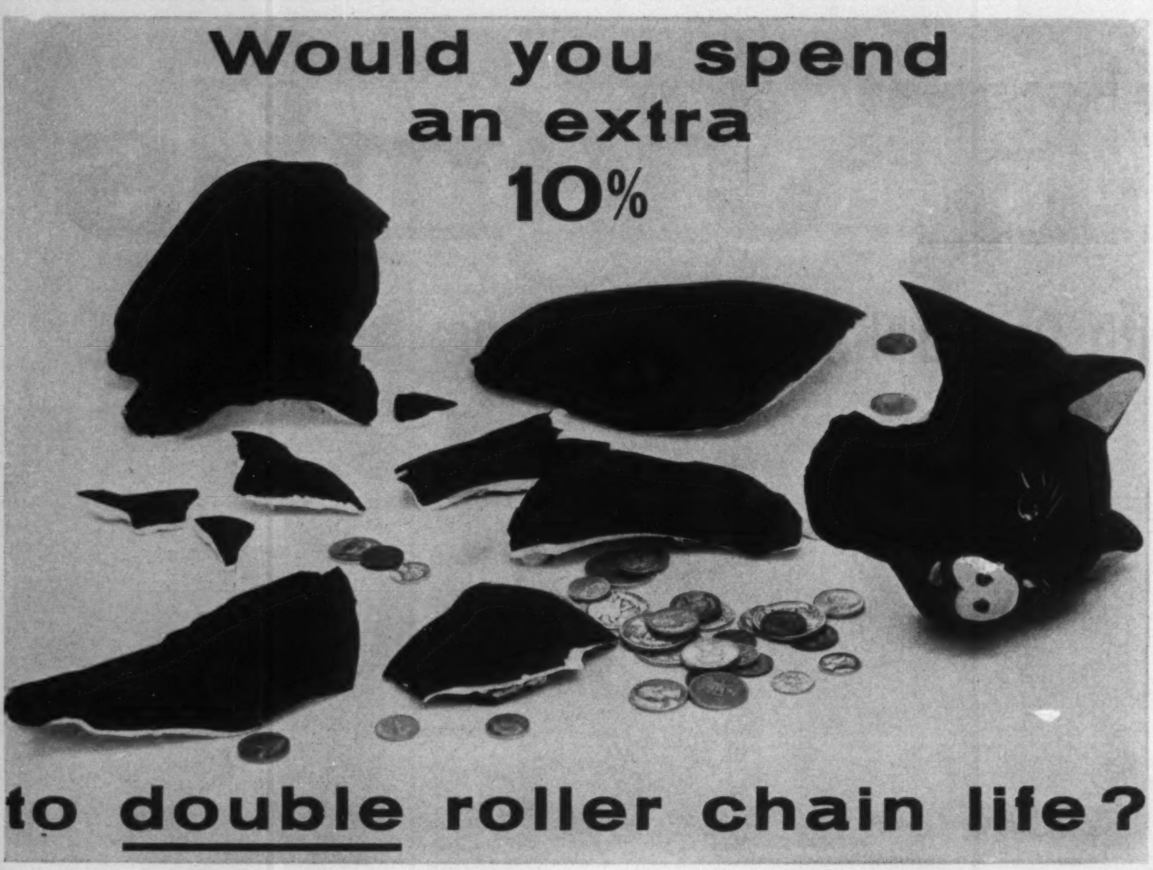
Also, see in operation the new Micropoint Precision Tool Grinder—first grinder capable of absolute control of tool geometry.

Rewarding revelations in automatic precision
await your next visit to Fair Street

DeVlieg

SPIRAMATIC
JIGMILS®

ACCURATE HOLES AND FLAT SURFACES
IN PRECISE LOCATIONS



Would you spend an extra 10% to double roller chain life?

Morse H-E Roller Chain overcomes metal fatigue . . .

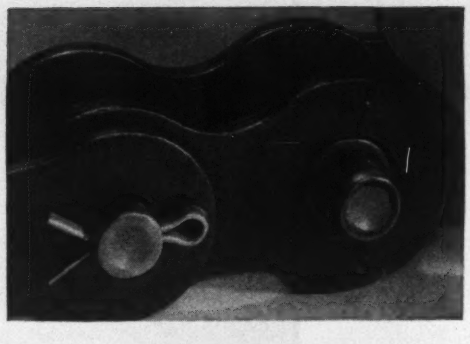
lasts from 2 to 5 times longer . . .

costs only 10 per cent more than ordinary roller chain!

Yes, now by paying just a slight premium you can buy Morse H-E (high endurance) roller chain . . . and get 2 to 5 times the service life over ordinary chain. Here's why:

Normal roller chain breaks sooner under the rigors of "stop-and-start" or heavy strain operations. It's this "tired metal" problem that plagues anyone who has used roller chain. Morse has developed a process to overcome metal fatigue. As a result, Morse H-E Roller Chain has a 95% greater endurance limit . . . lasts up to 500% longer . . . costs just 10% more.

Make a test yourself. Next time you need roller chain, try Morse H-E and compare. Your Morse Chain distributor is the man to see. He's listed in the Yellow Pages under "Power Transmission." Or write: Morse Chain Company, Dept. 33-80, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.



ORDINARY CHAIN BREAKS when the side plate tires from repetitive loading and unloading during the cycle around the sprockets. But Morse H-E Roller Chain has a 95% higher endurance limit . . . outlasts ordinary chain by up to 5 to 1 under repeated loading.

MORSE BW T.M.

A BORG-WARNER INDUSTRY

ONLY MORSE OFFERS ALL FOUR: Roller Chain, Silent Chain, Hy-Vo® and "Timing"® Belts

UE&FCO

ed and built by . . .

UNITED®

HIGH SPEED
5-STAND
TANDEM COLD MILL

UNITED
UNITED
UNITED
UNITED

UNITED

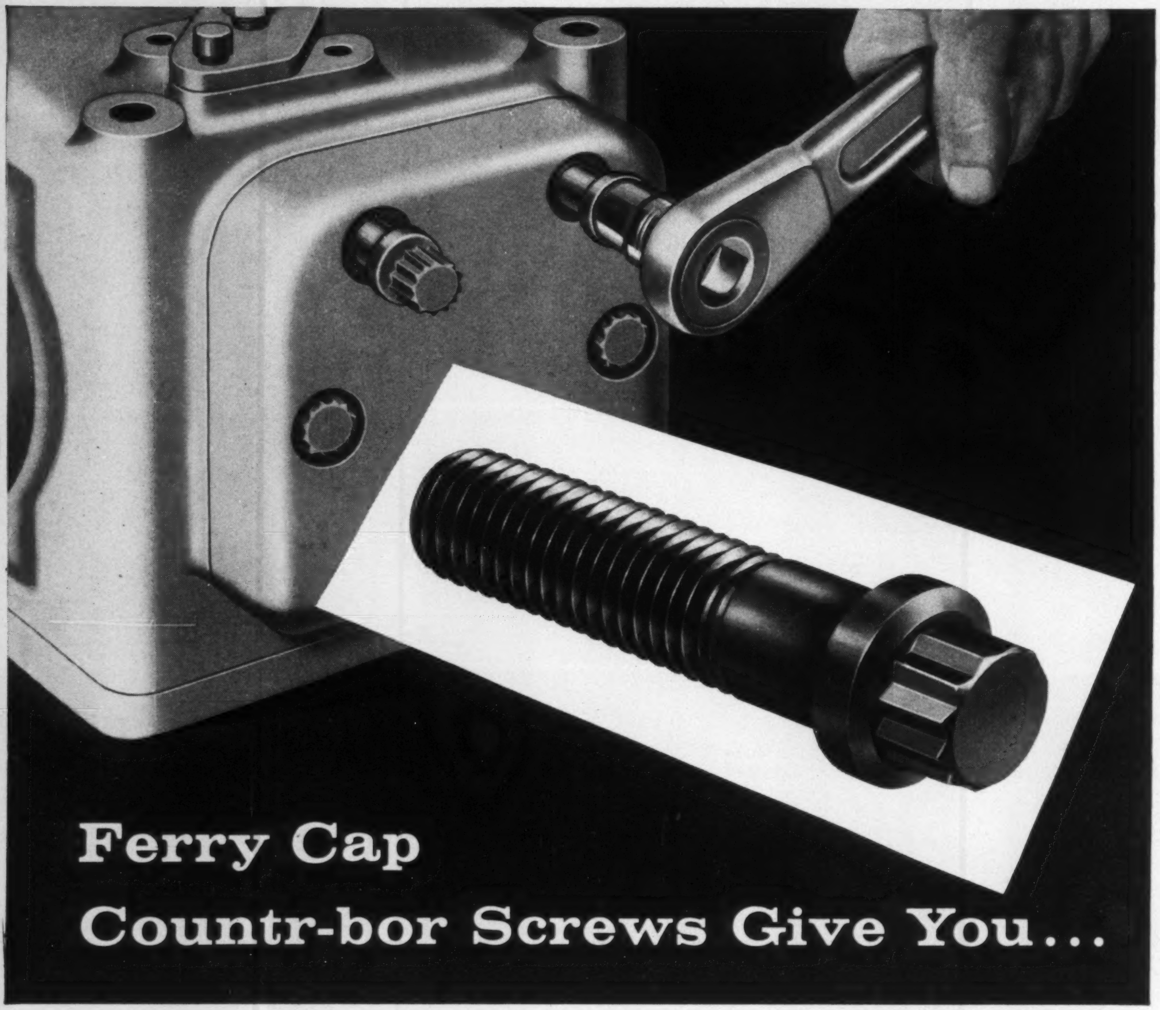
ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown,
Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.



Tighter Wrenching...Faster Assembly Up to 20% Purchase Cost Savings

Every time you use Countr-bor Screws you improve your products *and* save both time and money. Made of high-strength alloy steel, Countr-bor Screws fit in standard counterbored holes . . . tighten with standard socket wrenches . . . cost up to 20% less than regular socket head cap screws.

Countr-bor Screws wrench down faster *and* tighter because they have 12 external gripping points . . . 3 times the gripping surface of internally wrenched socket head screws. Without the usual gaping hole of socket heads, Countr-bor Screws look better, too. Countr-bor Screws can also save you money for flat surface applications where clearances are tight.

Countr-bor Screws are available in sizes from ¼" through 1". Special sizes, threads and materials are available on order.

**Start saving now . . .
send for free test samples of
any desired size.**

F-C

Ferry Cap & Set Screw Company
2151 Scranton Road, Cleveland 13, Ohio

Machine Tool Exposition
Sept. 6-16 Chicago

NIAGARA BOOTH 1330 MMT-PE

a whole press and shear show in itself!

Once again, Niagara has come through with the "newest of the new"! Never before have so many new developments in metal forming and shearing machines been planned into so large an exhibit area. All told, there'll be a "live" show of a dozen machines in operation . . . many engaged in actual production.

From aisle to aisle, here is an action-packed exhibit that will prove especially profitable to press, press brake, and shear users looking for new ways to boost production, improve work quality, and cut costs.
Key men from Niagara (yes, top management, too) will be on hand to welcome you and answer questions on-the-spot. Come. Visit Niagara. Allow plenty of time. See all there is to see.

NIAGARA

NOW TURN THE PAGE for a glimpse of what you'll see in Booth 1330

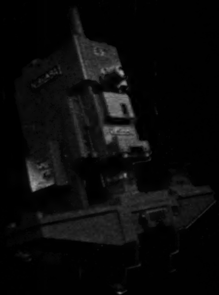
. . . AND they'll all be in action at the Machine Tool Exposition

Mech. Sleeve Clutch OBI Press with forming die and demonstration of Niagara Portable Tonmeter.

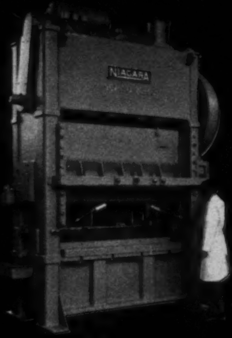
60-ton Inboard Drive Mech. Press Brake. Will perform several operations with multi-deck forming die.

100-ton Double Crank Straight Side Fully Automatic Press with progressive die. Will be shown in production along with Niagara's Load Monitor.

Underdrive Power Squaring Shear, 10 gage capacity, 96" cutting length.



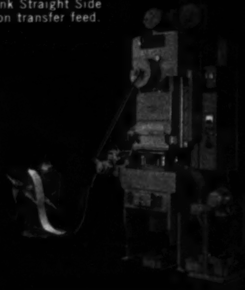
Sliding Bolster Front-to-Back Crankshaft OBI Press. Will produce giant bottle openers with 2 quick-change dies.



150-ton Double Crank Straight Side Press with 9-station transfer feed.

250-ton, 2-pt. suspension, Straight Side Eccentric Geared Press for automation line. Will produce parts with unique Adjustable Draw Die.

150-ton Mech. Press Brake with alternating 2-speed stroke control. Will form bends on long sheets.



45-ton Front-to-Back Crankshaft OBI Press with automatic roll feed, stock reel, & scrap cutter. Will stamp fuse tips at million/day rate.

Ultra High Speed Automatic OBI Press package with progressive dies. Will operate at variable speeds up to 1000 spm producing parts at rate of over million/day.

Overdrive Power Squaring Shear with 18" gap, ½" capacity, 144" cutting length.

NIAGARA
HD400-10-12

400-ton Hydraulic Press Brake to be exhibited with variety of forming dies.

NIAGARA

NIAGARA MACHINE & TOOL WORKS · BUFFALO 11, N. Y.

District Offices and Distributors Everywhere

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work

40-ton Plymouth M-Series Locomotive switches boxcars for Andersen Corp., Minnesota building products manufacturer whose annual production fills about 2700 cars.

"Handles 7 times the load of our former unit"

In the words of T. H. Fredrickson, Plant Engineer for Andersen Corp., Bayport, Minnesota: "Our Plymouth has proven to be an extremely durable piece of equipment—with the reserve power and positive braking action to perform our job efficiently and economically. It moves 7 times the load hauled by our former 10-ton locomotive, resulting in considerable savings to us in material handling costs. We would not be able to handle our present yard traffic without it."

The 40-ton gasoline-powered Plymouth Model "M" is equipped with Torqomotive drive. Used for switching freight cars in the plant rail yard, it works 30 to 35 hours a week, hauls 15 loaded boxcars or 20 empties over a 3-mile stretch of track with grades ranging up to 3%.

For full information on a Plymouth designed to fit **your haulage needs,** send a brief outline of your operations to: The Fate-Root-Heath Company, Dept. A-2, Plymouth, Ohio.

RAIL POWER

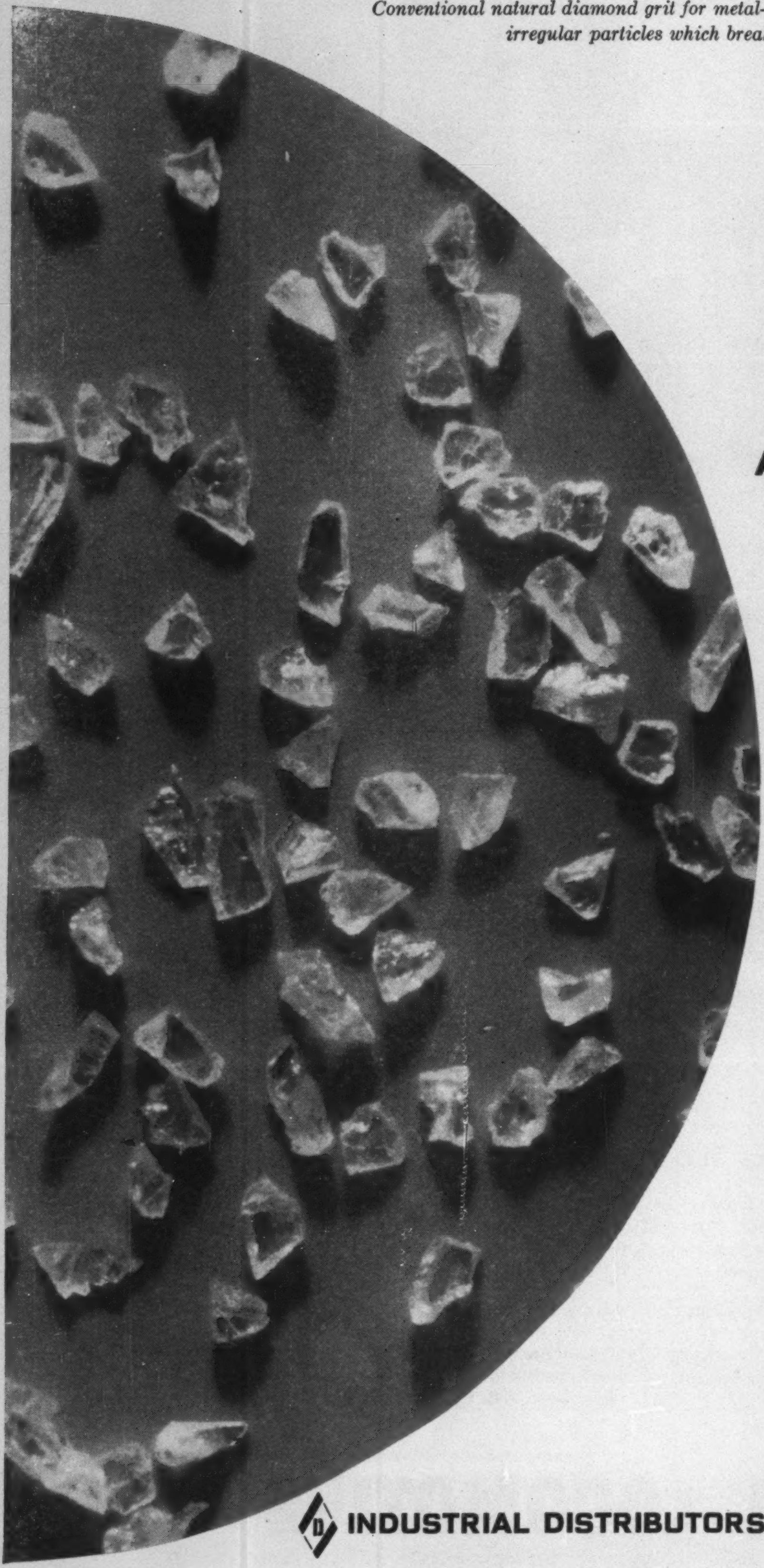
PLYMOUTH® LOCOMOTIVES

WITH TORQOMOTIVE DRIVE

ALSO BUILDERS OF F-R-H CERAMIC MACHINERY

PLYMOUTH
LOCOMOTIVES
in Progressive Industry
throughout the world

Conventional natural diamond grit for metal-bond wheels and saws. Note the friable irregular particles which break down under heavy pressure grinding.



ANNOUNCEMENT:

NEW

NATURAL

DIAMOND GRIT

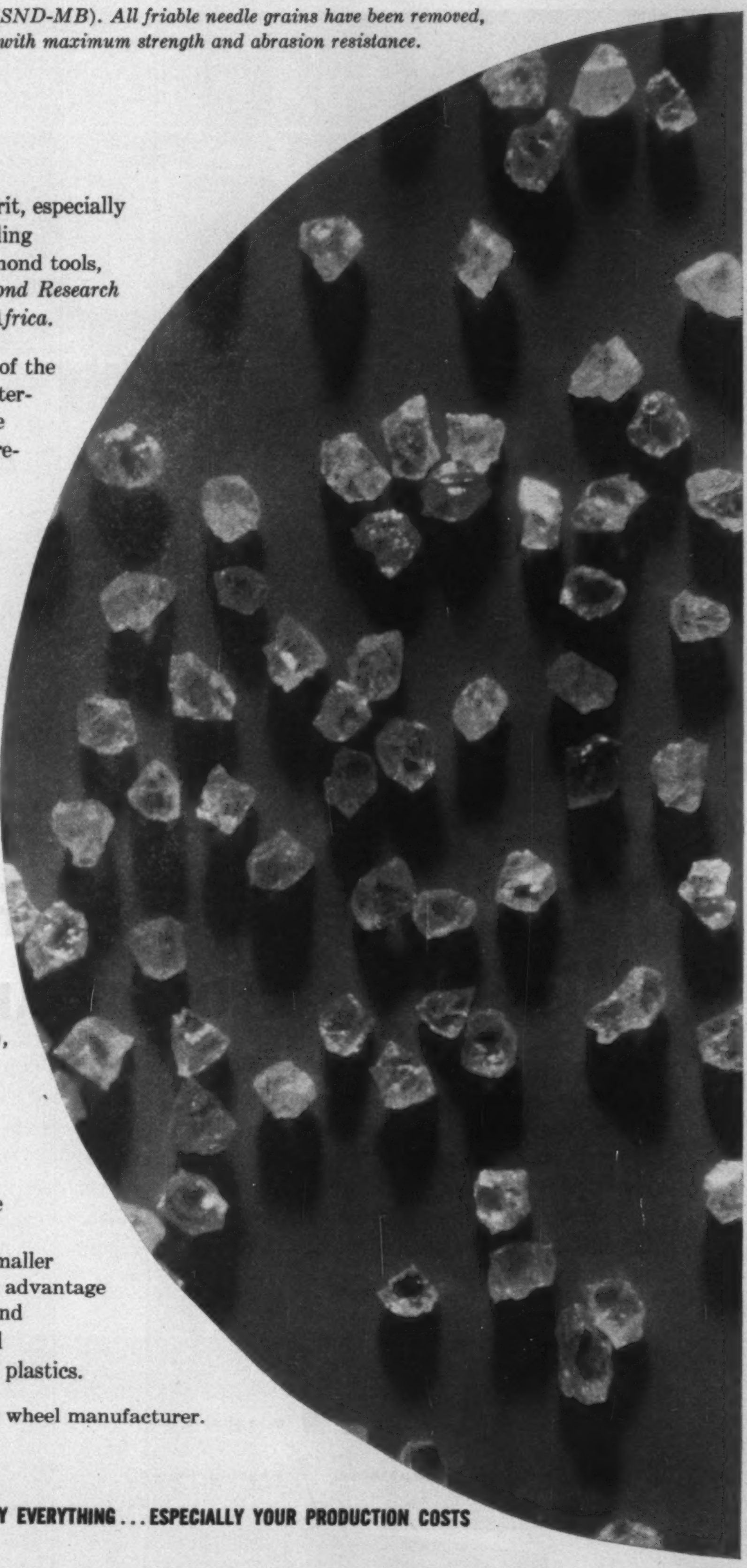
FOR

METAL-BOND

WHEELS

INDUSTRIAL DISTRIBUTORS (SALES), LTD., *London*

New Selected Natural Diamond Grit (SND-MB). All friable needle grains have been removed, leaving only the blocky, cube-like grit with maximum strength and abrasion resistance.



A new type of natural diamond grit, especially suited for use in metal-bond grinding wheels and other metal-bond diamond tools, has been developed at the *Diamond Research Laboratory, Johannesburg, South Africa.*

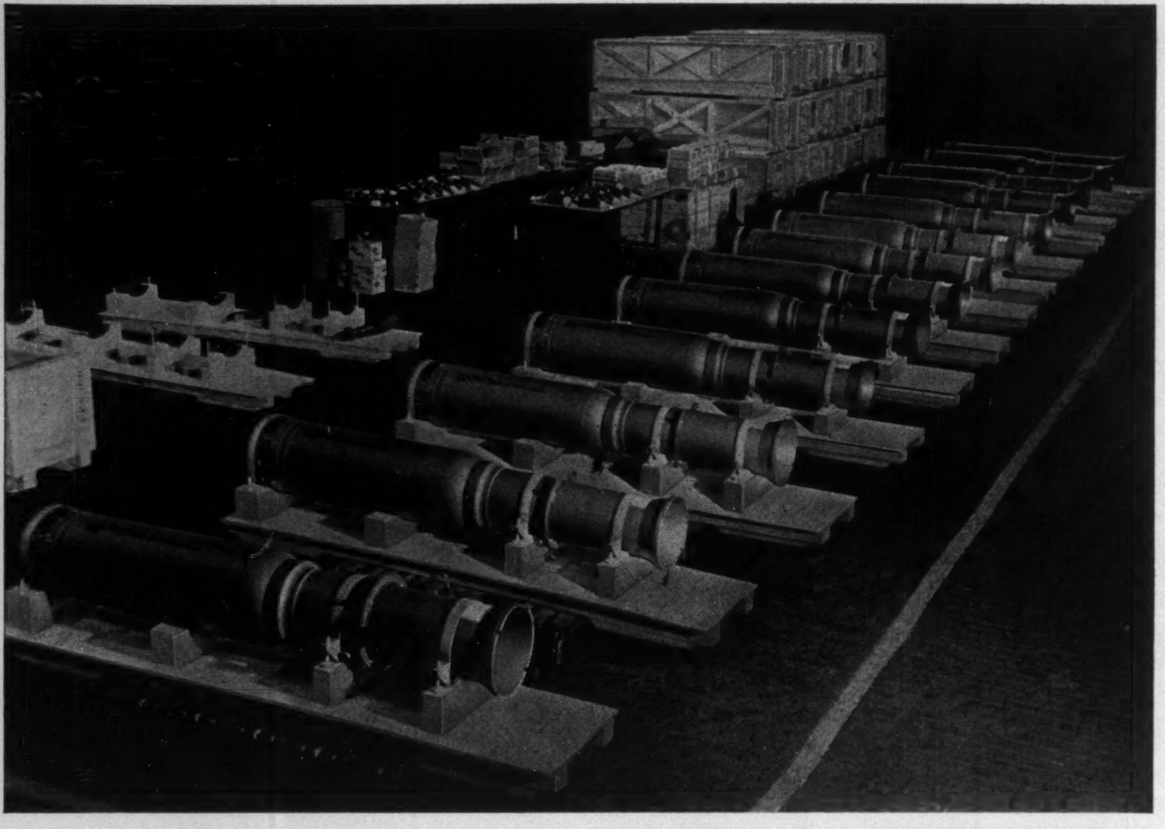
This new natural grit is made up of the strongest, most abrasion and shatter-resistant diamond particles for use in metal matrixes. A new pressure-testing and selecting process removes friable particles from the grit. Thus, the inherent strength of the natural diamond particle is ideally presented for the heavy-duty cutting done with metal-bond wheels and saws.

The new grit has been found stronger than any diamond grit available to date. In tests with concrete, marble, and tile, the new grit permitted a 30 to 50 per cent faster cutting rate than was previously possible. Further tests are under way in actual production set-ups.

Known as SND-MB (SELECTED NATURAL DIAMOND-METAL BOND), the new grit will be offered in a production range of mesh sizes from Tyler screen 16 to 325 mesh at present. The larger sizes will be used in metal-bond saws and thin-wall core drills, which are used in cutting concrete, stone and other rugged materials. The smaller cube-like diamonds will be used to advantage in metal-bond wheels for cutting and grinding of materials like glass and ultra-hard ceramics and reinforced plastics.

SND-MB is now available to your wheel manufacturer. Ask him about it.

INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING . . . ESPECIALLY YOUR PRODUCTION COSTS



Part of a shipment of XM10E1 rocket motor metal parts assemblies manufactured by Parish for the Army's Lacrosse missile, a vital weapon in America's arsenal.

PARISH Helps Mass-Produce Missiles to Protect America!

Building *motor metal parts assemblies* for the U.S. Army's Lacrosse missile–being produced by Martin Company–calls for the capacity to produce in quantities a high precision mechanism of the most rigid specifications–so the job went to Parish.

To insure reliability and accuracy . . . to enable the missile–while traveling at fantastic speeds–to hit a target, the motor metal parts assembly cannot vary more than ¼ of 1% of design weight. It must be perfectly balanced and all parts must be completely interchangeable.

Parish has the diversified facilities, the tools and experienced personnel to produce these ultra precision assemblies in substantial volume. If you have a production problem that fits this pattern, write to us. We can help.

P PARISH

PARISH PRESSED STEEL

DANA Division of Dana Corporation / Reading, Penna.

● **DANA PRODUCTS:** Transmissions ● Universal Joints ● Propeller Shafts ● Axles ● Torque Converters ● Gear Boxes ● Power Take-Offs ● Power Take-off Joints ● Rail Car Drives ● Railway Generator Drives ● Stampings ● Spicer and Auburn Clutches ● Parish Frames ● Forgings.

BOOTH
1339

MINST

*first in **press** design*

1960 MACHINE TOOL EXPOSITION
September 6-16

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

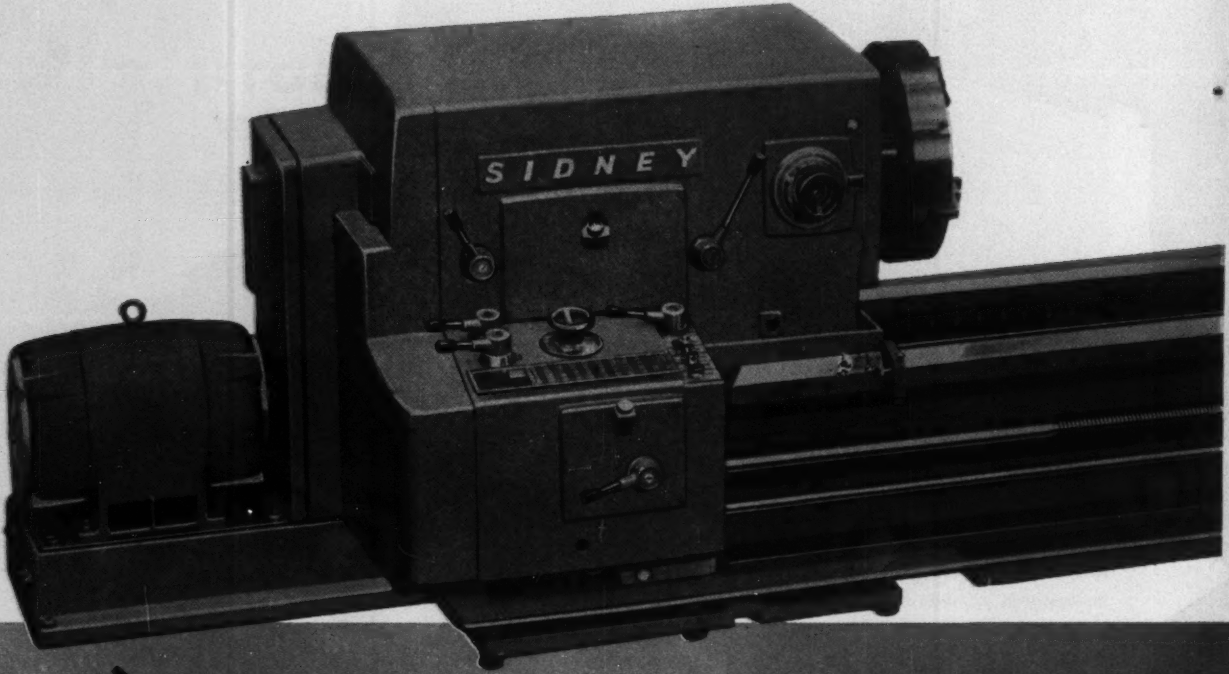
International Amphitheatre
Donovan Hall

Chicago, Illinois

THE **MINSTER** MACHINE COMPANY
MINSTER, OHIO

MEMBER OF THE NATIONAL
MACHINE TOOL BUILDER'S ASSOCIATION

A GREAT OLD NAME

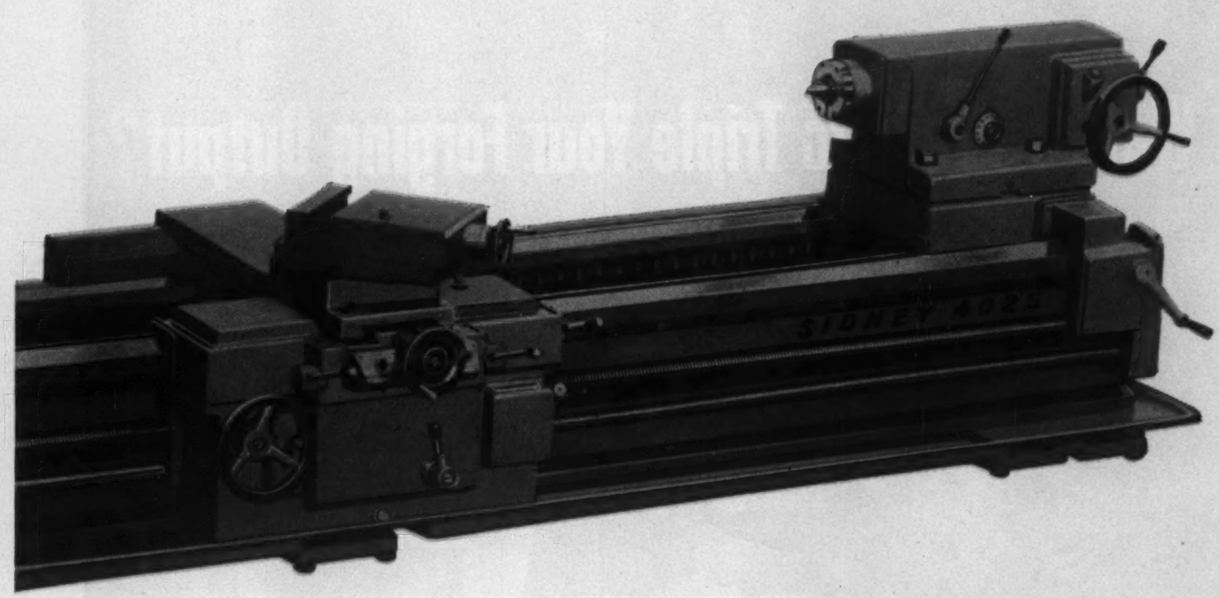


all-new

SIDNEY

4025

GETS new GLORY



AN all-new LATHE FROM THE FLOOR UP

Now! From one of the most respected names in the machine tool industry comes a completely new lathe, the Sidney 4025. The extra heavy-duty 4025 is a product of Sidney's years of experience plus extensive research among lathe users to determine the features most wanted in a lathe. The result is an all-new lathe which removes metal faster, easier and at lower cost on a wide range of jobs. Here are just a few outstanding features of the new Sidney 4025:

75 HORSEPOWER IN ALL SPEED RANGES makes possible a metal removal rate of up to 180 cubic inches per minute. This extra power gets the job done faster and at lower cost.

DUAL CAM TUMBLER LOCK FOR GEARBOX eliminates the possibility of gear and cone gear unlocking during exceptionally heavy feeds. Gearbox also provides 60 threads and feeds for greater versatility.

SPEED RANGE OF 5 TO 800 R.P.M. permits the selection of a surface speed to handle a larger variety of work or materials. The Sidney 4025 can achieve a 22 to 26 micro inch surface finish.

THREE DIMENSIONAL TRUSS DESIGN OF BED gives exceptional rigidity to handle the torsional load of the full 75 horsepower. The one piece bed also features replaceable hardened and ground tool steel ways.

SIMPLIFIED CONTROLS located at a convenient height for the operator provide faster, easier operation. Spindle controls consist of a single dial and shifting lever for either r.p.m. or surface speeds.

DEPTH READING DIAL measures tailstock spindle travel to eliminate possibility of operator error. Operator-selected live or dead spindle is optional for maximum control and versatility.

PLUS... Anti-friction bearings throughout, automatic lubrication, and many other exceptional features. For complete information contact your local Sidney Distributor or write directly to:

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO / A WHOLLY OWNED SUBSIDIARY OF BUHR MACHINE TOOL CO.

SEE THE SIDNEY LATHES in action at the National Machine Tool Exposition, September 6 thru 16, Chicago. Booth 1440.

Want a Press to Triple Your Forging Output?

We'll build the press for all your forging requirements . . .

Tell us your forging problems and give us your production specifications—we'll do the rest.

Erie Foundry, one of the first companies to automate forging, can provide specially designed *high volume* presses in capacities of 1000 to 8000 tons. Instead of the three machines and nine men formerly required, now you need only one Erie automated forging press and only one operator observer—to triple your present production rate! Trimming, too, can be accomplished in a single production cycle. With billet supply and finished part removal conveyorized, it is possible to achieve a production volume of, say, 1200 track-link forgings per hour.

Erie Foundry has a complete line of machines designed for high volume production of such parts as connecting rods, gear blanks, automotive and tractor valves, pinions, track links and wheel hubs.

We would like to discuss application of automated presses to your production requirements. For the complete story, phone or write Mr. R. E. Sanford, Erie Foundry Company, Erie 1, Pa.

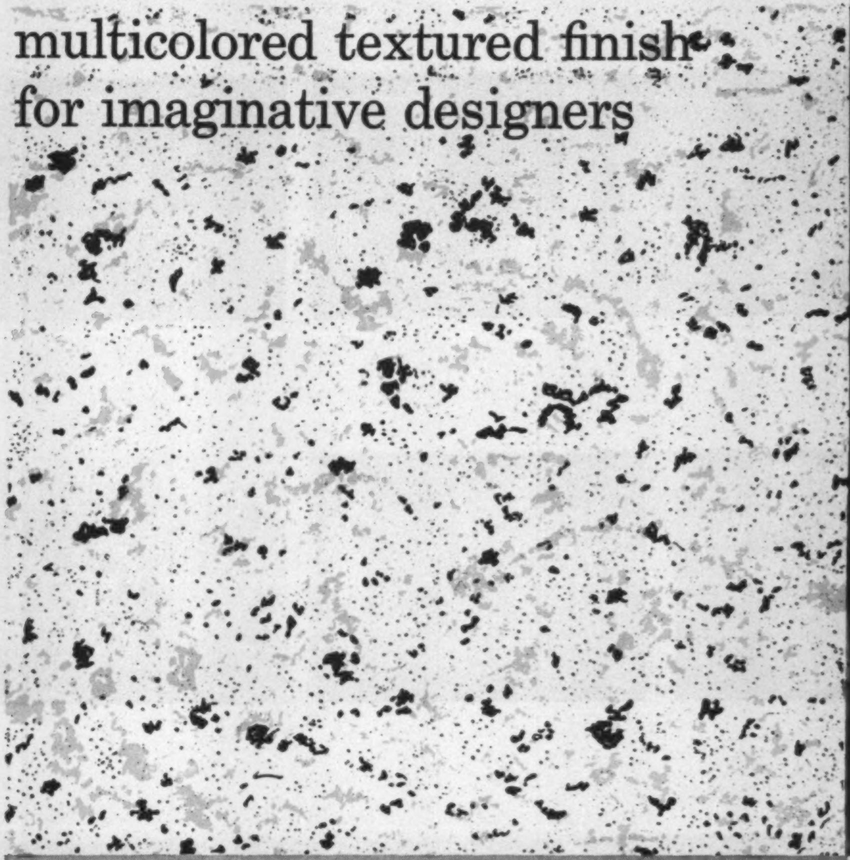
ERIE

ERIE FOUNDRY CO.

The world's great name in forging since 1895 EF-59-01

LASTING Eye Appeal
PLEXTONE®

multicolored textured finish for imaginative designers



In little more than a decade, Plextone has become an accepted industrial finish. Continuous research has resulted in new colors, new design effects, greater durability, wider application. Today, this textured, multicolored industrial finish has reduced costs up to 35 percent. Its one-coat application of two or more interlaced colors is sprayed at **one** time, from **one** gun! Shown above is just one of many pre-mixed Plextone colors available for prompt shipment.

For complete data and 1960 color card, mail the coupon today.

Leadership in finishes since 1876

MAAS & WALDSTEIN CO.

2114 McCARTER HIGHWAY, NEWARK 4, N. J.

Midwest Division: 1658 Carroll Avenue, Chicago 12, Ill.
Pacific Coast Division: SMITH-DAVIS CO., 10751 Venice Blvd., Los Angeles 34, Calif.

Maas & Waldstein Co.
2114 McCarter Highway, Newark 4, N. J.
Please rush color chips & complete data on new PLEXTONE.

Name__________

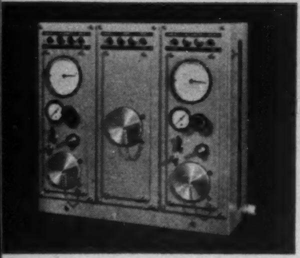
Title__________

Company__________

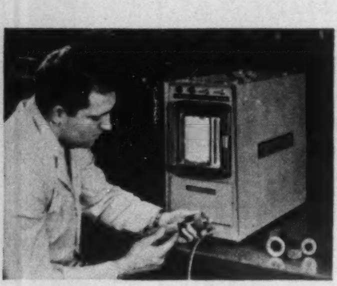
Street__________

City__________

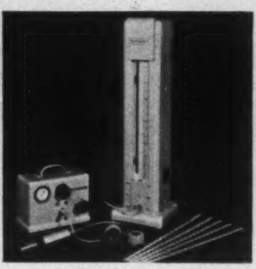
How many of these products



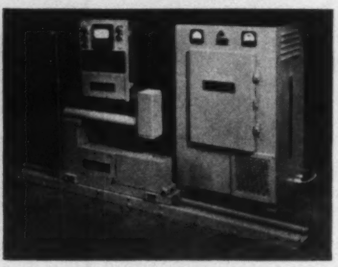
1



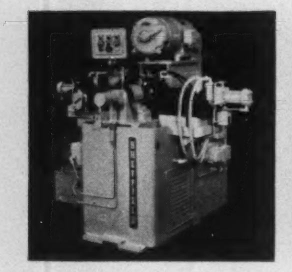
2



3



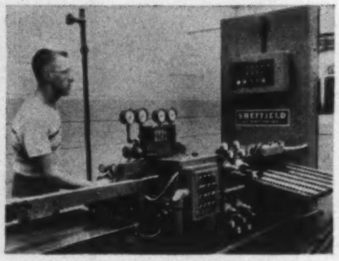
4



8

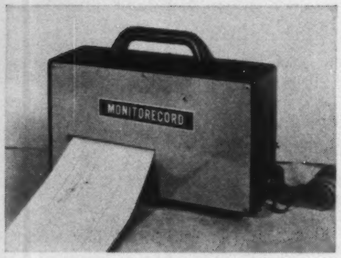
SHEFFIELD
SHEFFIELD

9

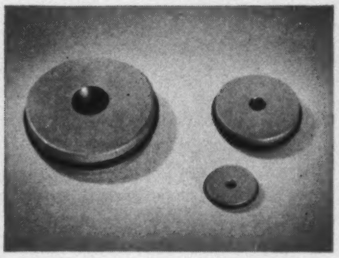


10

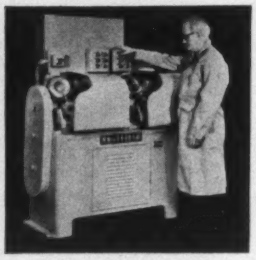
15



16



17



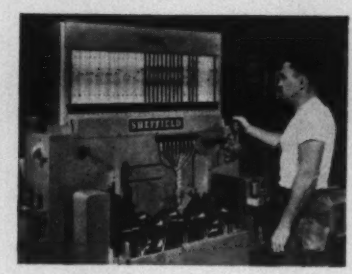
18

1. Pneumatic gage control unit
2. Pneumatic Recorder
3. Precisionaire® gages
4. Measuray® thickness gage
5. Crankshaft gage
6. Multiform grinder
7. Machine control unit
8. Thread rolling machine
9. Double end precision threading machine
10. Automatic piston pin gage
11. Plunjet airsnap
12. Thread and form grinder
13. Automatic bearing assembly machine
14. Airetest® indicator
15. Press-Pacer® transfer machine
16. Monitorecord® machine operations analyzer
17. Master setting rings, xxx and xxxx
18. Gear chamfering machine
19. Micro-Form grinder
20. Plunjet® gaging cartridges
21. Cavitron® ultrasonic metal working machine

See the whole Sheffield line in action at Booth 201

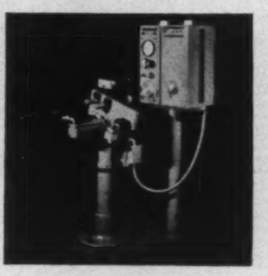
Machine Tool Show near the main entrance

can you identify?

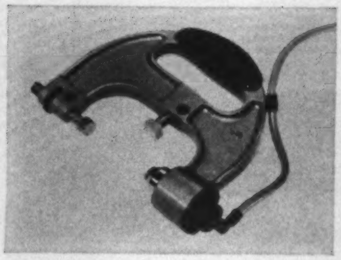


5

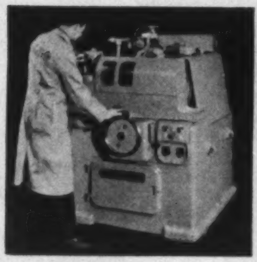
6



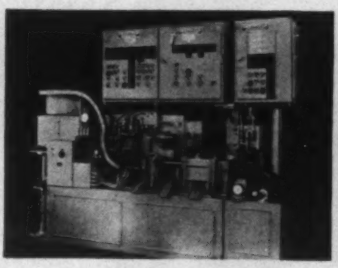
7



11

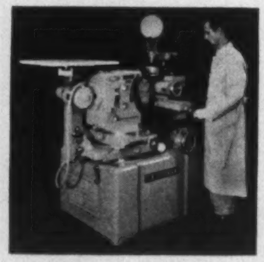


12

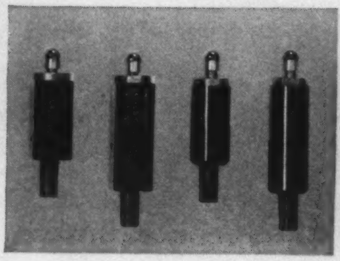


13

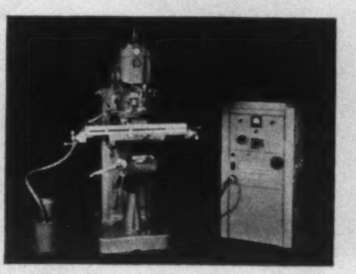
14



19



20



21

Here are some of the many products Sheffield makes. You'll do well to identify even half of those shown. It will pay you to get a copy of Sheffield's condensed catalog No. GC957.

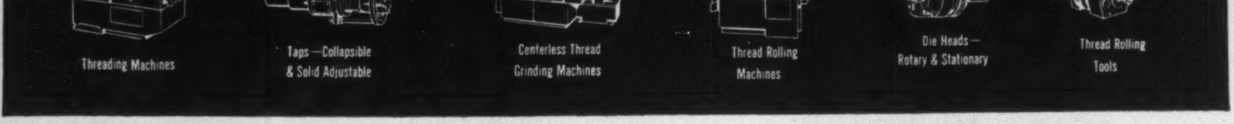
Or for specific product information, circle the number, clip the ad and mail. We'll send the appropriate catalogs.

The
SHEFFIELD
Corporation *Dayton 1, Ohio*

A subsidiary of The Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

[redacted]


Threading Machines
Taps—Collapsible & Solid Adjustable
Centerless Thread Grinding Machines
Thread Rolling Machines
Die Heads—Rotary & Stationary
Thread Rolling Tools

THIS THREAD ROLLING OPERATION

will come to life at MMT=PE *booth* 432

The Thread Rolling operation illustrated here, and a series of other threading operations, will be demonstrated by the Landis Machine Company in Booth 432 at the Machine Tool Exposition. At the booth you will get a close first-hand look at how Thread Rolling has proved to be beneficial in many ways to a growing number of users.

You will see demonstrated on the LANHYROL and LAN-NU-ROL Thread Rolling Machines: ❶ Infeed Rolling that reduced overall cost by 80%; ❷ Continuous Knurling and Rolling in one spindle revolution; ❸ Reciprocal Rolling of large diameters; ❹ Automatic Infeed Rolling of involute splines; ❺ Roll-straightening of double-end studs; ❻ Continuous Rolling of extra long threads; ❼ Automatic Thrufeed Rolling; ❽ High Production Infeed Rolling; ❾ Infeed Rolling of large diameter double-end studs; ❿ Automated Infeed Rolling.

TAPPING and CUTTING operations will also be demonstrated on the Coupling Tapping Machine, the 4-Spindle Semi-Automatic, and various models of the LANDMACO Threading Machine. These include: (1) Automatically tapping threads in external upset tubing couplings; (2) Cutting threads on insulator pins at a high production rate; (3) Cutting large diameter threads; (4) Cutting threads on close nipples automatically; (5) Cutting threads with an automated LANDMACO Threading Machine.

In addition, the complete line of Die Heads, Taps, Thread Rolling Attachments and Thread Rolling Heads will be displayed. Experienced LANDIS engineers will be available to discuss any problem dealing with method, equipment, or thread design.

LANDIS *Machine* COMPANY

WAYNESBORO, PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

UP TO 40 TIMES LONGER WEAR

LINDE's FLAME-

—the 6,000-degree, supersonic process that "welds" tungsten carbide and other materials to working surfaces—giving them today's greatest resistance to abrasion, galling, erosion, fretting, corrosion, and high-temperature wear

LONGER service life . . . less down time . . . fewer rejects . . . reduced operating costs!

These are only a few of the important advantages that LINDE's Flame-Plating process builds into machines, parts, accessories, and products that depend on the stamina of metal surfaces for required performance. Exclusive Flame-Plating guns literally "blast" molten particles of tungsten carbide or aluminum oxide at specific areas—at 2,500 fps—depositing a hard, welded-on coating which can be precision-finished to the desired microinches rms.

Dimensional stability unchanged

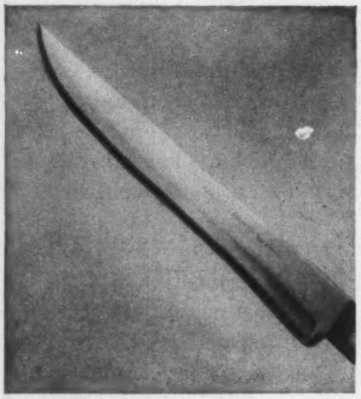
While temperatures above 6,000°F. are reached within the oxy-acetylene detonation gun, the temperature of the work piece is maintained below 250°F. This eliminates warpage or distortion of even minute precision parts.

Depending on thickness of finish applied, or use of the wearing part, Flame-Plating has been known to multiply wear resistance more than 40 times.

Hundreds of potential applications

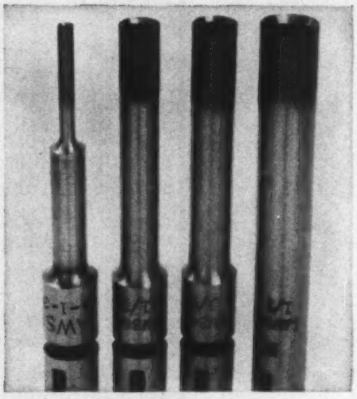
Other properties include low coefficient of friction, porosity less than one per cent, and excellent corrosion resistance. Coatings show outstanding reliability under high temperature, heavy load, and lack of lubrication or cooling.

The list on the right-hand page (opposite) shows a few of the many current and possible applications for Flame-Plating. Perhaps the process could be used profitably in one or more of your operations. We suggest you indicate your possible applications on the coupon and mail today for more information.



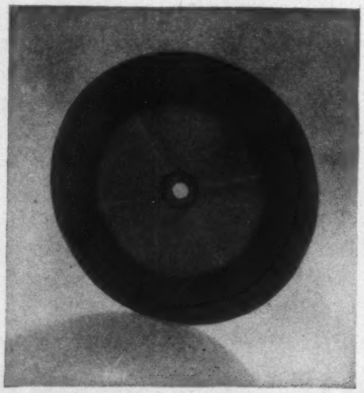
ROBESON CUTLERY

LINDE's Flame-Plating provides Robeson Cutlery Co., Inc., with a distinctive merchandising theme. The Robeson line of *"Flame Edge"* cutlery is featured as "The Greatest Development in 2000 years of Cutlery Making—a Cutting Edge of Tungsten Carbide."



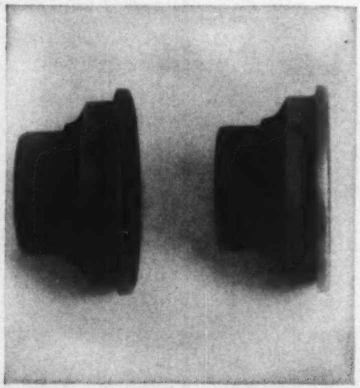
LAWSON PAPER DRILLS

Paper manufacturers report increases in drill life up to 20 times with Lawson Company Flame-Plated tips. Less "puckering" delivers better quality; fewer stops for sharpening bring savings which outweigh the extra cost of Flame-Plating many times over.



RUBBER SKIVING KNIVES

Before Flame-Plating, skiving knives used in the rubber industry had to be sharpened after every shift. Since adoption of Flame-Plating the service life of this tool has been increased 15 times. A sharp edge is always present, due to a *self-sharpening* effect.



SEAMING CHUCKS

LINDE's Flame-Plating is an important time-and-money-saver for the abrasive-resistant, tolerance-stable seaming chucks used by major canners. Operating life is more than 4 times longer. Chucks, when worn, can be salvaged, replated, and returned to use.

for Metal Parts—Metal-Coated by

PLATING

THE "LINDE" FLAME-PLATING GUN—and how it works

In LINDE's revolutionary Flame-Plating process, precise quantities of oxygen, acetylene, and tungsten carbide powder—representing "powder and shot"—are fed into the gun by a special mechanism. The gun is aimed at the areas to be coated, then fired by remote control. Precision-controlled rapid-firing (4 per second) builds up the coating to the desired thickness. The as-coated smoothness of 125 microinches rms can be finished down to better than 1 microinch rms finish.

PHYSICAL DATA—FLAME-PLATED COATINGS

COATING DESIGNATION	LW-1	LW-1N	LW-5	LC-1A	LA-2
Approx. Composition by weight	Tungsten Carbide +6% to 8% Co	Tungsten Carbide +13% to 16% Co	25% WC +7% Ni + mixed W-Cr Carbides	85% Cr_3C_2 + 15% Ni-Cr	99% +Al_2O_3 (gamma)
Hardness Vicker's (VPN_{300})	1200 to 1450	1050 to 1150 VPN 70 to 71 R_c	1000 to 1200 VPN	850 VPN	1000 to 1200 VPN
Maximum temp. in oxidizing atmosphere	1000°F.	1000°F.	1400°F.	1800°F.	1200°F. to 1800°F.
Coefficient of thermal expansion	4.0×10^{-6}/°F. Avg. 70 to 1000°F.	4.7×10^{-6}/°F. Avg. 70 to 1000°F.	4.6×10^{-6}/°F. Avg. 70 to 1400°F.	6.4×10^{-6}/°F. Avg. 70 to 1800°F.	3.9×10^{-6}/°F. Avg. 70 to 1832°F.
Modulus of Rupture	67,000 psi	80,000 to 106,000 psi	40,000 psi	75,000 psi	22,000 psi
Modulus of Elasticity	44×10^6 psi	42 to 40×10^6 psi	17×10^6 psi	22×10^6 psi	16×10^6 psi
Porosity	0.5%	0.5 to 1.0%	0.5%	0.5%	1.0%
Specific Gravity	14.2	13.2	10.1	6.54	3.45
Specific Heat	0.048	0.056	0.070	0.127	0.196
Thermal Conductivity	5.3 at 500°F.	5.3 at 500°F.	3.8 at 500°F.	4.3 at 500°F.	0.86 at 500°F.
Main features	Extreme wear resistance	Excellent wear resistance + increased resist. to mechanical and thermal shock.	Excellent wear resist. to higher temps. Improved corrosion resist.	Good wear resist. at high temp. or in corrosive media. Resists flame impingement.	Excellent resist. to wear, chem. attack and high temperature deterioration.

TYPICAL FLAME-PLATING APPLICATIONS

BEARINGS—sleeve, roller, gas
BLADES—aircraft turbine; doctor blades for papermaking
BLOCKS—anvil
BUSHINGS—ball piston pump
CHUCKS—seaming
CUTLERY—household
CUTTING, INDUSTRIAL—rubber, plastic, skiving knives, foods, paper, slitter knives, chipper knives, discontinuous chip-abrasive materials
DIES, TOOLING—cold-forming; coring punches, core rods, sizing punches, capstans
DOGS—sewing machine feed; gripping dogs
DRILLS—paper, acoustical tile, twist
GAGES—plug, ring, air
GUIDES—wire, textile, machine
HYDRAULICS—pistons, liners, valve plates, wobble plates, metering valves, servo valves, slippers
MANDRELS—wire-forming
PARTS—sintered
PISTON RINGS
PLATES—valve, wear
SEALS—turbine engine, pump
SURGICAL—needle holders and shears
VALVES—aircraft

Linde Company, Flame-Plating I-811
270 Park Avenue
New York 17, New York

I am interested in Flame-Plating for the following application(s):

____

____

____

NAME__________ TITLE______

COMPANY________________

ADDRESS________________

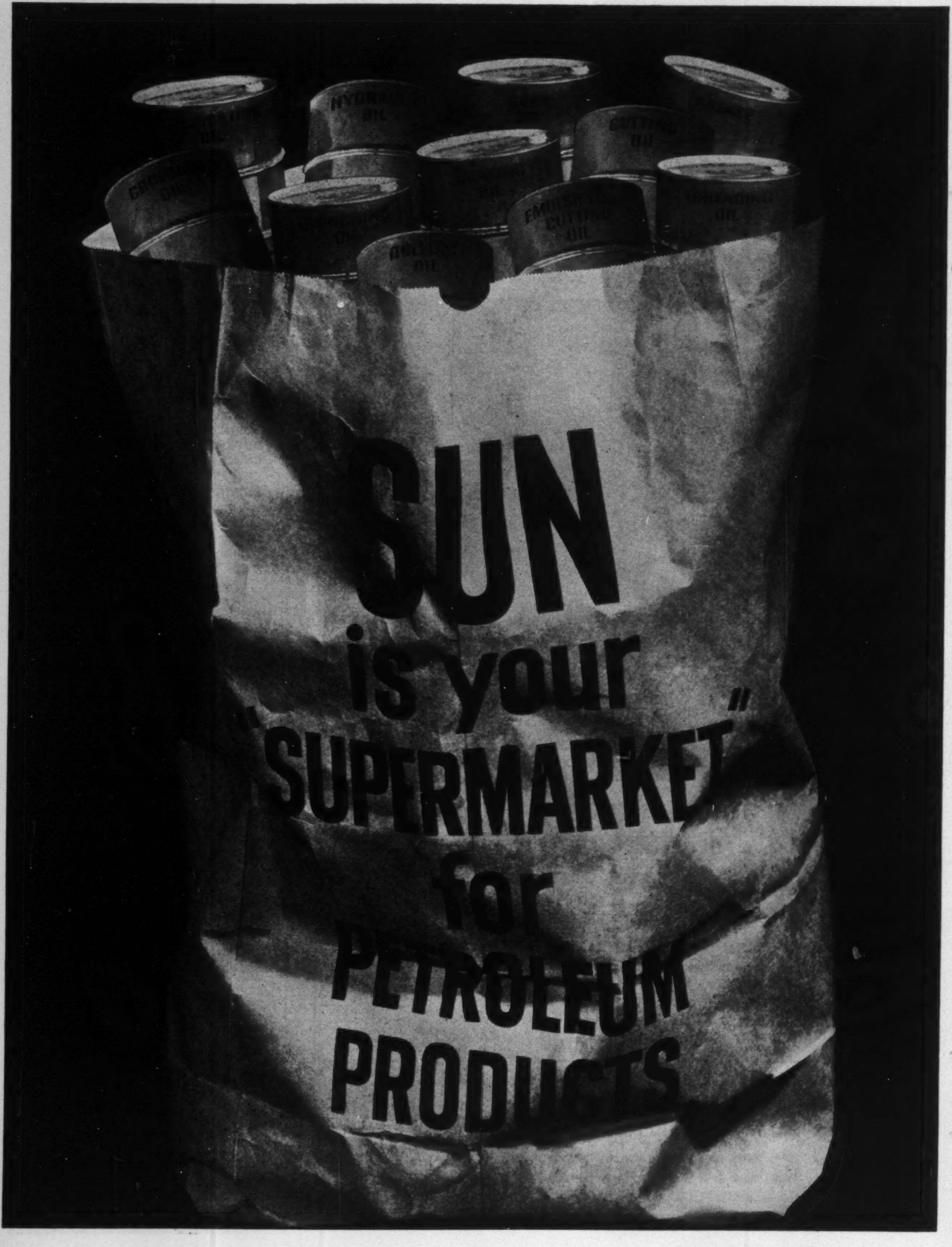
CITY________ ZONE___ STATE_____

LINDE COMPANY

Division of Union Carbide Corporation

UNION CARBIDE

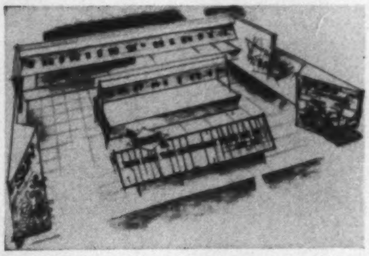
LINDE and UNION CARBIDE are trade-marks of Union Carbide Corporation.


CUTTING OIL
EMULSIFYING CUTTING OIL
THREADING OIL
SUN
is your
"SUPERMARKET"
for
PETROLEUM
PRODUCTS

Does it make sense to shop around for petroleum products when you can get the best of everything from one source? Not when you can save time and money by dealing at Sun's "Supermarket," a single source of hundreds of quality petroleum products.

Your local Sun man is a human encyclopedia of technical know-how based on research and experience. He'll give you all the technical help you need.

You'll like dealing at the Sun "Supermarket"... where quality has been established as the best economy of all. Call your local Sun man, or write SUN OIL COMPANY, Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.

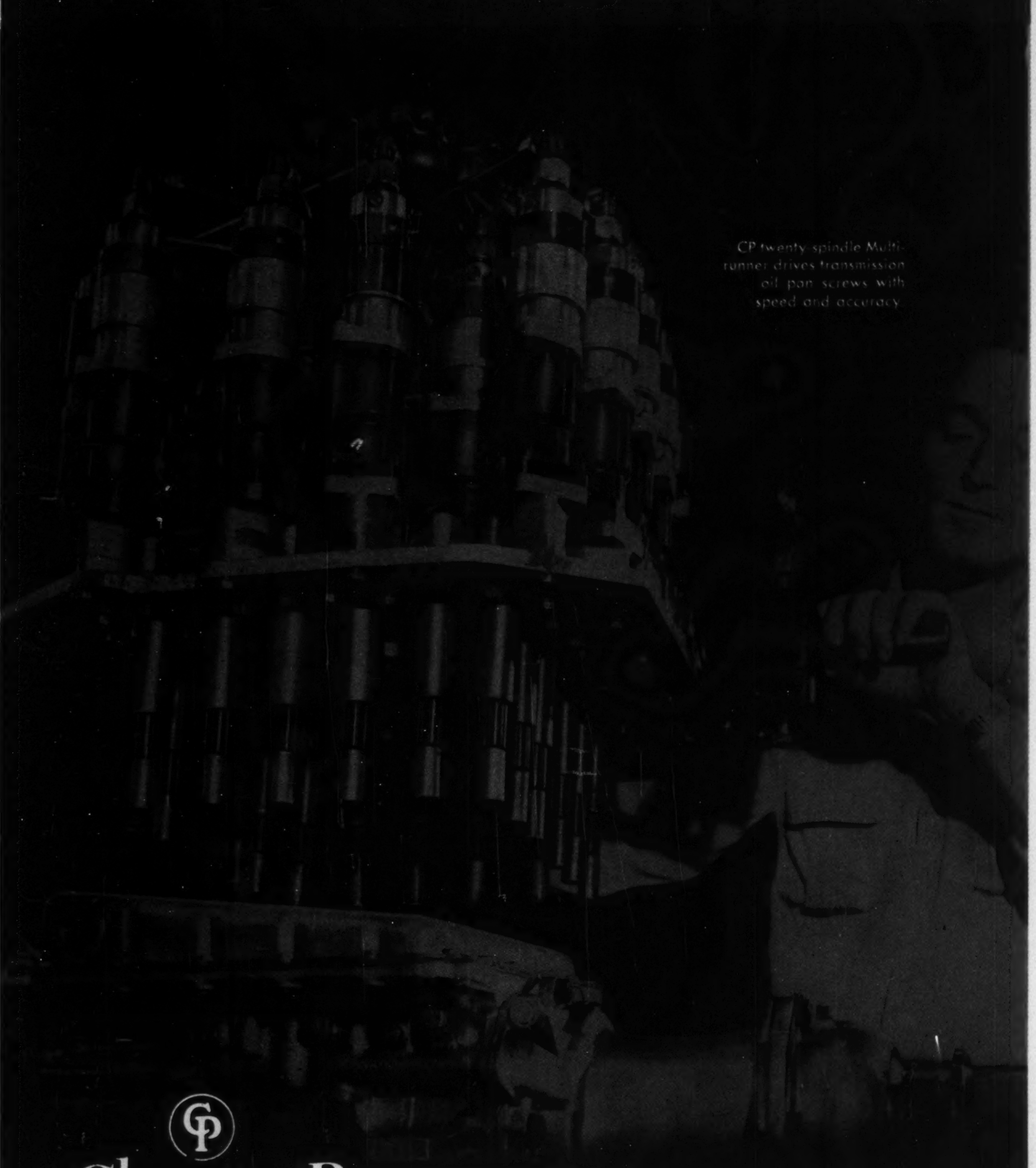


Be sure to visit the Sun exhibit at the Machine Tool Builders Show in International Amphitheatre, Chicago, Illinois. Sept. 6-16. Booth 1513.

SUNOCO

ORIGINATORS OF CUSTOM-BLENDED BLUE SUNOCO GASOLINES

Fastener driving accuracy–



CP twenty-spindle Multi-runner drives transmission oil pan screws with speed and accuracy.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

an ASTME Show highlight

CP demonstrates latest in "One-Shot" Torque Control Screwdrivers and Nutrunners

The CP Booth at the ASTME Show in Detroit really packed them in. Production men responsible for assembly, quality control and standards learned first-hand facts about "one-shot" Torque Control tools. They watched new hand-held tools and multi-spindle units prove their consistent accuracy... saw a new Torque Analyzer prove its ability to test and calibrate Torque Control power tools. They proved for themselves, that CP Screwdrivers and Nutrunners can hold the specific torque settings so essential on today's fast-moving production lines.

The CP exhibit featured the most extensive line of standard "one-shot" straight and angle Screwdrivers and Nutrunners, Multiple Motors and Impact Wrenches ever offered to the assembly industry.

If you missed the show... don't miss the facts. To get the full story on CP "One-Shot" drivers for hand-held or multi-spindle job requirements—use the handy coupon below.

NEW **CP-200 Torque Analyzer tests and calibrates torque control power tools.**

NEW **CP-3017 Dial Tork Nutrunner, the only instantly adjustable power tool that inspects as it drives.**

NEW **Micro-Tork Screwdrivers for large or small fasteners.**

NEW **CP-3090-ATN-300 "jolt-free" Angle Nutrunner.**

one-shot

TORQUE CONTROL

SCREWDRIVERS

NUTRUNNERS

ANGLE NUTRUNNERS

MULTI-RUNNER MOTORS

for precise installation of threaded fasteners

FEATURING—

Micro-Tork the only instantly-adjustable power tool that inspects as it drives.

AND

the CP-200 Torque Analyzer for testing and calibrating torque control power tools.

Chicago Pneumatic

GET 12 PAGES OF STRAIGHT FACTS ON "ONE-SHOT" TORQUE CONTROL TOOLS. USE THIS COUPON TO MAKE SURE OF YOUR FREE COPY.

Chicago Pneumatic Tool Co., Dept. I-80
8 East 44th Street, New York 17, N. Y.

Please send a copy of SP-3266, your 12 page color booklet on "One-Shot" Torque Control Screwdrivers, Nutrunners, Angle Nutrunners, Multi-Runner Motors and Torque Analyzers.

Name______________________________

Company______________________________

Address______________________________

City________________Zone______State________

TREADWELL COOLING BED

built in tandem, each over 100 ft. long. Each bed will cool 125 tons of 4" x 4" steel per hour.

For heavy duty and efficient production, this steel company called on Treadwell Engineers. The result . . . these Treadwell Cooling Beds are efficiently operating day in and day out.

If you have a machinery problem, call on Treadwell Engineers.

Pictured above: Treadwell Cooling Beds at work in an eastern steel mill.

TREADWELL

SALES AND ENGINEERING OFFICES:

208 S. LA SALLE STREET
CHICAGO 4, ILL.
CEntral 6-9784

1015 FARMERS BANK BLDG.
PITTSBURGH 22, PA.
ATlantic 1-2883

Manipulators, Mill, etc.
Mills, Billet, Merchant & Bar
Mills, Rod
Special Machinery
Coilers & Reels

Conveyors, Coil
Drives & Pinions
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Cooling,

Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers

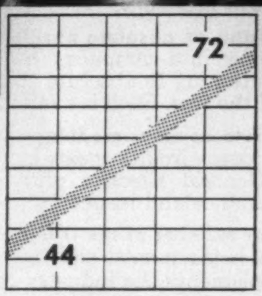
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)

CASTINGS—Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

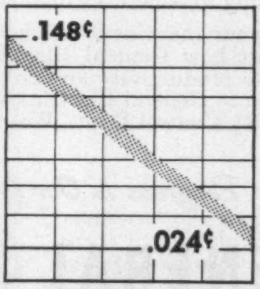
V-R CUTS threads faster CUTS costs 83%

NEW IDEA at MISSION

MISSION MANUFACTURING CO., Houston, Texas, manufacturers of oil field and industrial equipment, now cuts threads using negative rake throw-away tooling with standard precision VR-73 inserts. Production has increased from 44 to 72 pieces per 8 hour shift. Threading tool costs have been cut 83% — from .148¢ to .024¢ per piece. Carbide grade VR-73 produces 3 times the pieces per cutting edge. The throw-away feature allows accurate indexing without tool changes and costly set-ups. These benefits are not obtainable with the previously used brazed tool. This new idea in tooling has also given Mission greater accuracy, improved finish and more consistent production. *Call your V-R man today. Write for fully illustrated catalog.*



PIECES PER SHIFT



COST PER PIECE

CREATING THE METALS THAT SHAPE THE FUTURE

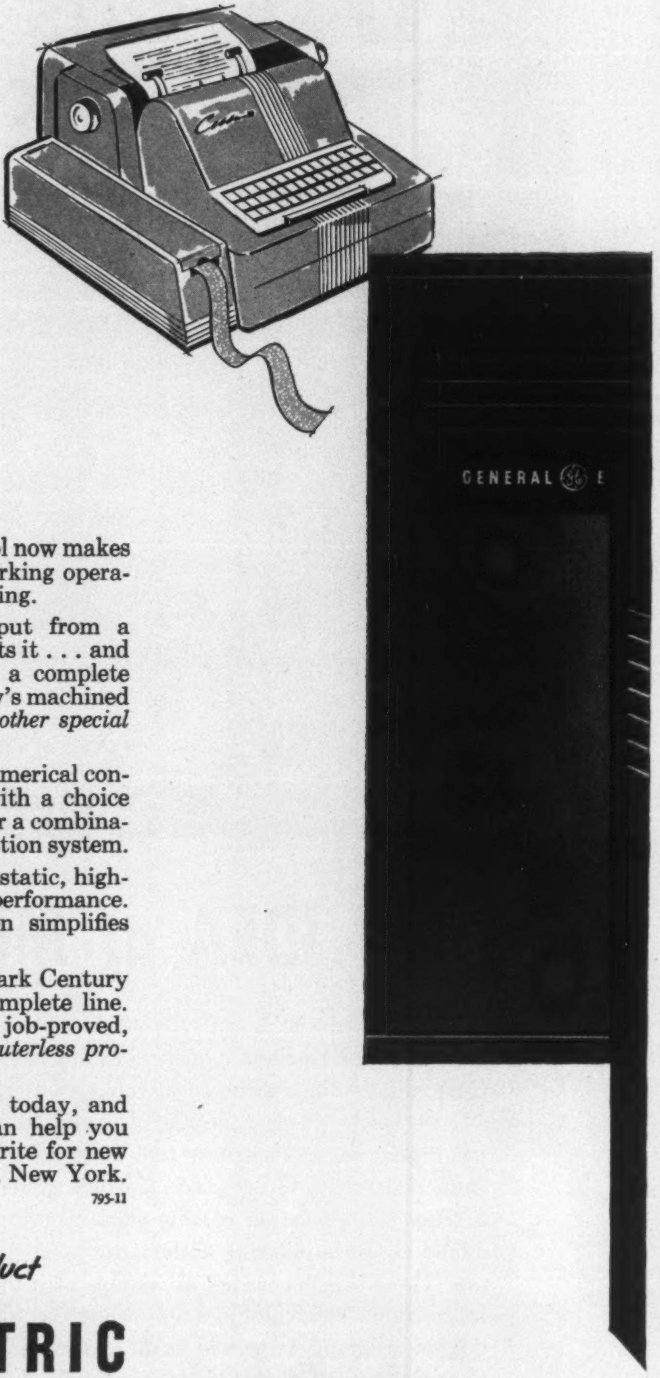
V-R VASCOLOY-RAMET

832 MARKET STREET • WAUKEGAN, ILLINOIS

C-795

NOW...

automatic contouring without a computer



New General Electric Mark Century numerical control now makes *computerless programming* a reality for most metalworking operations . . . including all radial and straight-line machining.

This new control system takes punched-tape input from a standard automatic typewriter . . . reads and interprets it . . . and automatically commands the machine to carry out a complete machining cycle. Producing more than 85% of industry's machined parts can be as simple as that—*with no computer or other special equipment necessary!*

Contouring or absolute positioning—Mark Century numerical control comes in a compact, "building-block" package with a choice of: positioning to absolute co-ordinates; contouring; or a combination of the two. Each is available as a 2-, 3-, 4-, or 5-motion system.

Solid-state devices, modular construction—Completely static, high-speed logic circuits mean long life and dependable performance. New General Electric plug-in, modular construction simplifies maintenance and inspection.

Another member of the G-E program control family—Mark Century control is the newest addition to General Electric's complete line. It supplements the industry-renowned Mark series of job-proved, low-cost numerical positioning control to bring *computerless programming* to America's metalworking industry.

See your machinery builder or G-E Sales Engineer today, and find out how General Electric numerical control can help you increase productivity and cut machining costs. Or, write for new bulletin to General Electric Company, Schenectady 5, New York. Specialty Control Dept., Waynesboro, Va. 795-11

Progress Is Our Most Important Product

GENERAL ELECTRIC

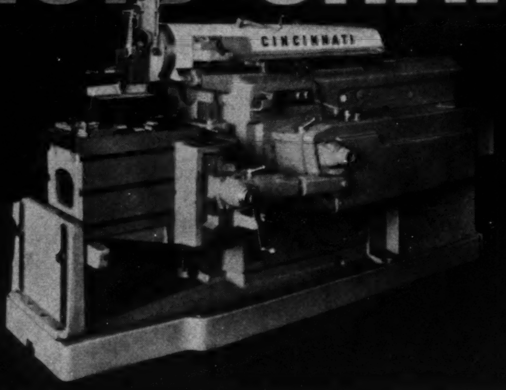
NEW MARK CENTURY

NUMERICAL CONTROL
FOR AUTOMATION

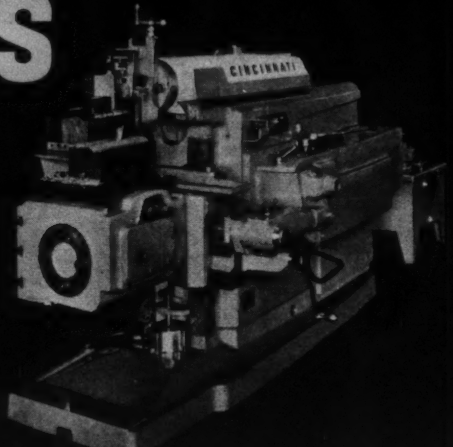
See General Electric numerical control at the Machine Tool Exposition and the Production Engineering Show, September 6—16, 1960, Chicago, Illinois.

NUMERICAL CONTROL

RIGID SHAPERS

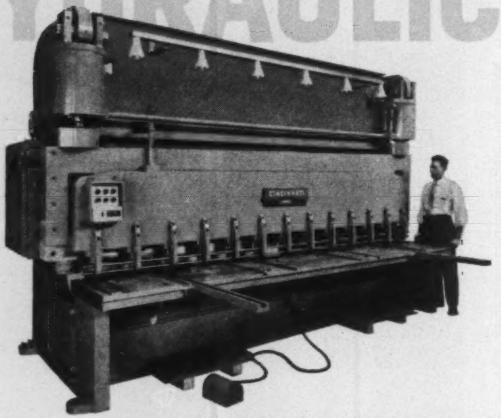


Fast and accurate metal removal will be exhibited by the Cincinnati 24" Rigid Shaper—see it cut 2" deep at .030" feed.

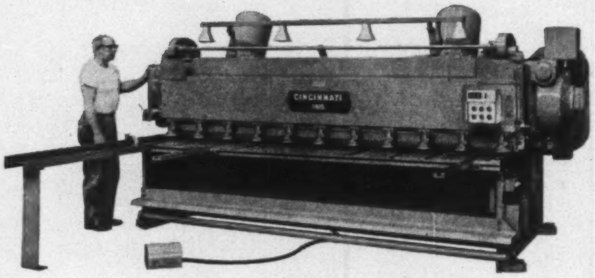


This 16" Cincinnati Duplicating Shaper demonstrates automatic tracing from a simple sheet metal template.

HYDRAULIC AND MECHA

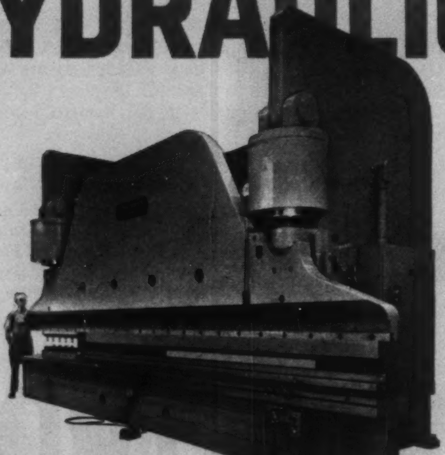


This new 5/8" x 12' Cincinnati Hydraulic Shear, with adjustable rake from 0" to 3/4" per foot, will cut from relatively thin sheets up to 3/4" mild steel plate.



Check the fast, accurate sheet shearing performance of this Series 1410 Cincinnati Shear (3/16" x 10' mild steel capacity) equipped with a magnetic sheet support.

HYDRAULIC AND MECHA



Don't miss seeing both plate forming and punching on this Cincinnati Series 750-H x 16' Hydraulic Press Brake. Fast set-up, long stroke and deep throat make it especially profitable for fabricators who produce varied shapes in plate.

The 3 Series x 10' Cincinnati Press Brake, 75 tons near bottom of stroke, has all the Cincinnati refinements: all-steel construction, centerline loading, rigid, micro-crowned bed and ram, motorized ram adjustment plus many other features.

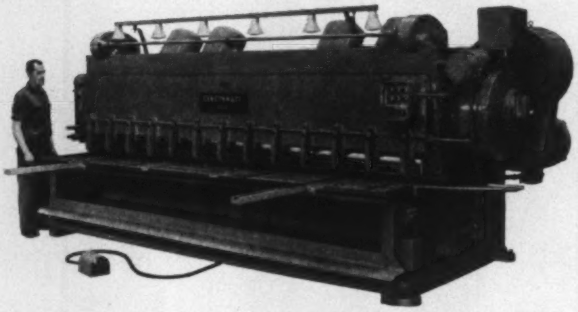
All in action at

THE CINCINNATI SHAPER CO.

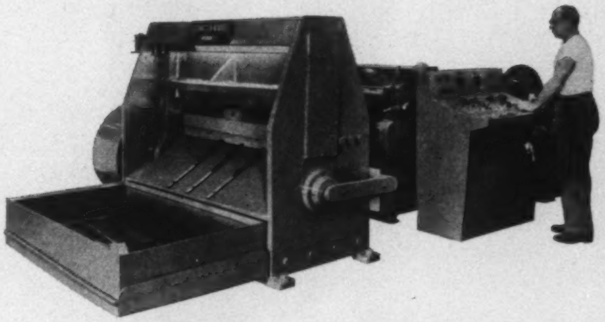
BOOTH 1230

Machine Tool Exposition—1960, Chicago, International Amphitheatre, September 6-16

NICAL SHEARS



Speed up your plate cutting jobs with Cincinnati mechanical plate shears, represented by this Series 4312 Cincinnati Shear (½" x 12' mild steel capacity).



See this new Cincinnati Hi-Speed Shear cut 18 ga. x 24" coiled stock at 200 strokes per minute. Used in conjunction with automatic coil-feeder-straightener.

NICAL PRESS BRAKES

The new 225 ton, 9 Series x 10' Cincinnati Automatic Cycle Press Brake demonstrates high-speed sheet metal forming without "clutch-slipping," "whip-up" or "back-bends." See the first real solution to high speed production with automatic bending action.

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

In Scotland: The Cincinnati Shaper Co., Ltd., Glasgow

FROM CREATIVE CRUCIBLE: HIGH SPEED STEELS THAT MAKE BETTER TOOLS POSSIBLE

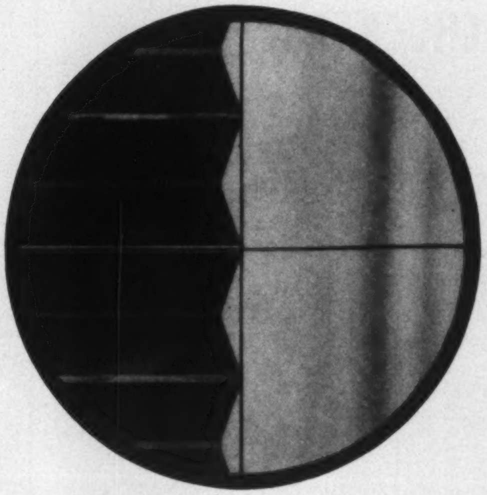
AN INSPECTOR CHECKS A "BOTTOMING" TAP for accuracy of the rake of the cutting face. Rex High Speed Steels help tapmakers produce the clean, accurate cutting edges so vitally needed in today's taps.

TODAY'S TRUE-RUNNING TAPS "TIGHTEN-UP" TOLERANCES

They produce more accurate threads – for closer fits – because of continually-improved Rex® High Speed Steels

The ground-thread taps you now use produce more accurate threads–*and last longer*–even when tapping tough abrasive materials or today's high-strength alloys.

There's a story behind this development of more accurate and productive taps. It's the story of the tapmakers' continuing research and increasing skill–combined with Crucible progress in making better high speed steels.



THE RAKE ANGLE of a ¾-10 H5 "bottoming" tap looks like this — when viewed through the rake measuring instrument shown at left.

To produce the fine steels needed for taps, Crucible tool steel specialists now use the most advanced electronic instrumentation available. For example: they can record the temperature of the molten metal in the melting furnace within 5 seconds. So, each heat is produced under identical temperature conditions.

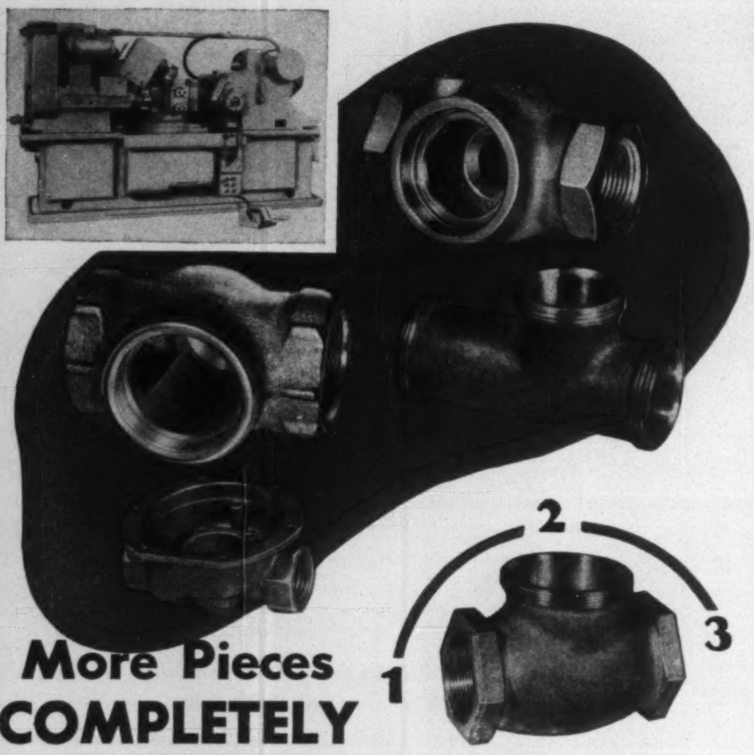
Crucible specialists employ new techniques that also greatly improve deoxidation of the liquid steel. They use new ingot mold designs to minimize segregation. And they ultrasonically inspect every billet of Rex High Speed Steel before rolling or forging to ensure freedom from internal voids, flake, inclusions, etc.

For complete information on how Rex High Speed Steels can help make precision tools better, call or write Crucible branch office or service center near you.

BETTER TOOLS, THROUGH BETTER STEELS. The constant improvement of Rex High Speed Steels ensures the increasingly better performance of hobs, broaches, twist drills, cutters and taps.

CRUCIBLE STEEL COMPANY OF AMERICA

Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Caldwell, New Jersey • Charlotte Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton • Denver • Detroit • Erie, Pennsylvania • Grand Rapids • Houston • Indianapolis Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia • Pittsburgh • Portland, Oregon • Providence Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Massachusetts • St. Louis • East Syracuse • Tampa • Toledo • Tulsa



More Pieces COMPLETELY *finished in less time on* GOSS & DE LEEUW AUTOMATIC CHUCKERS

This machine . . . already acknowledged and accepted as a metal-working achievement, and the only standard one of its kind . . . winds up a day's operation with all parts assigned to it completely finished and with no secondary operations necessary. When fully loaded, a complete piece is finished at each index cycle. High productivity is attained with simple tooling.

The "1-2-3" exclusive Goss & DeLeeuw feature provides for finishing machining three ends of a part simultaneously or in sequence. All operations are performed in a single set-up, and complete finishing done in much shorter time than by conventional methods.

Goss & De Leeuw
A Revolutionary Automatic Chucking Machine
Goss & DeLeeuw
One-Two-Three

Booth No. 348

Send for illustrated literature which fully describes this recent Goss & DeLeeuw development in chuckers. Submit samples of your work for time and cost estimates.

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

GOSS & DELEEUW
QUALITY · PRODUCT · QUANTITY · PRODUCTION

GOSS & DE LEEUW AGENTS

CALIFORNIA
Morgan Machinery Company
2040 Santa Fe Avenue
Los Angeles 21, California

ILLINOIS
Robert T. Gordon
1105 Chicago Avenue
Oak Park, Illinois

MICHIGAN
J. E. Bullock
19449 James Couzens Highway
Detroit 35, Michigan

MINNESOTA
Martin Machine Tool Company
2817 Hennepin Avenue
Minneapolis 8, Minnesota

OHIO—WESTERN PENNSYLVANIA
S. B. Martin Company
17305 Miles Avenue
Cleveland 28, Ohio

PENNSYLVANIA—EASTERN
Mr. John L. King, Jr.
Production Machinery Distributors
53 Long Lane, Upper Darby, Pennsylvania

• • • • •

AUSTRALIA
McPherson's Limited
260 Kent Street
Sydney (NSW), Australia

CANADA
Williams & Wilson, Limited
544 Inspector Street
Montreal 3, Canada

ENGLAND
Charles Churchill & Co. Ltd.
Coventry Road, South Yardley
Birmingham, England

FINLAND
Aktiebolaget EKSTROMS Maskinaffar
P.O. Box 310
Helsingfors, Finland

FRANCE
EMID Industrie
173, Faubourg Poissonniere
Paris, 9e, France

ITALY
Morini & Bossi
Via Mauro Macchi 87
Milano, Italy

SWEDEN
Maskinaktiebolaget KARLEBO
P. O. Box 360
Stockholm 1, Sweden

Cable Address
"GOSSLEEUW"
Western Union-Liebers

PERFECT SEALS OF METAL TO GLASS keep this Radar System on Track

Hundreds of components in this radar system—tubes, connectors, thermal relays, transistor stems, etc. contain seals of metal to glass. These seals are made possible by special metal alloys having the same expansion coefficient as glass.

At Bishop we have been making glass-to-metal sealing alloys in tubular and composite wire form for many years. In addition, we produce stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as clad metals, super and "exotic" alloys.

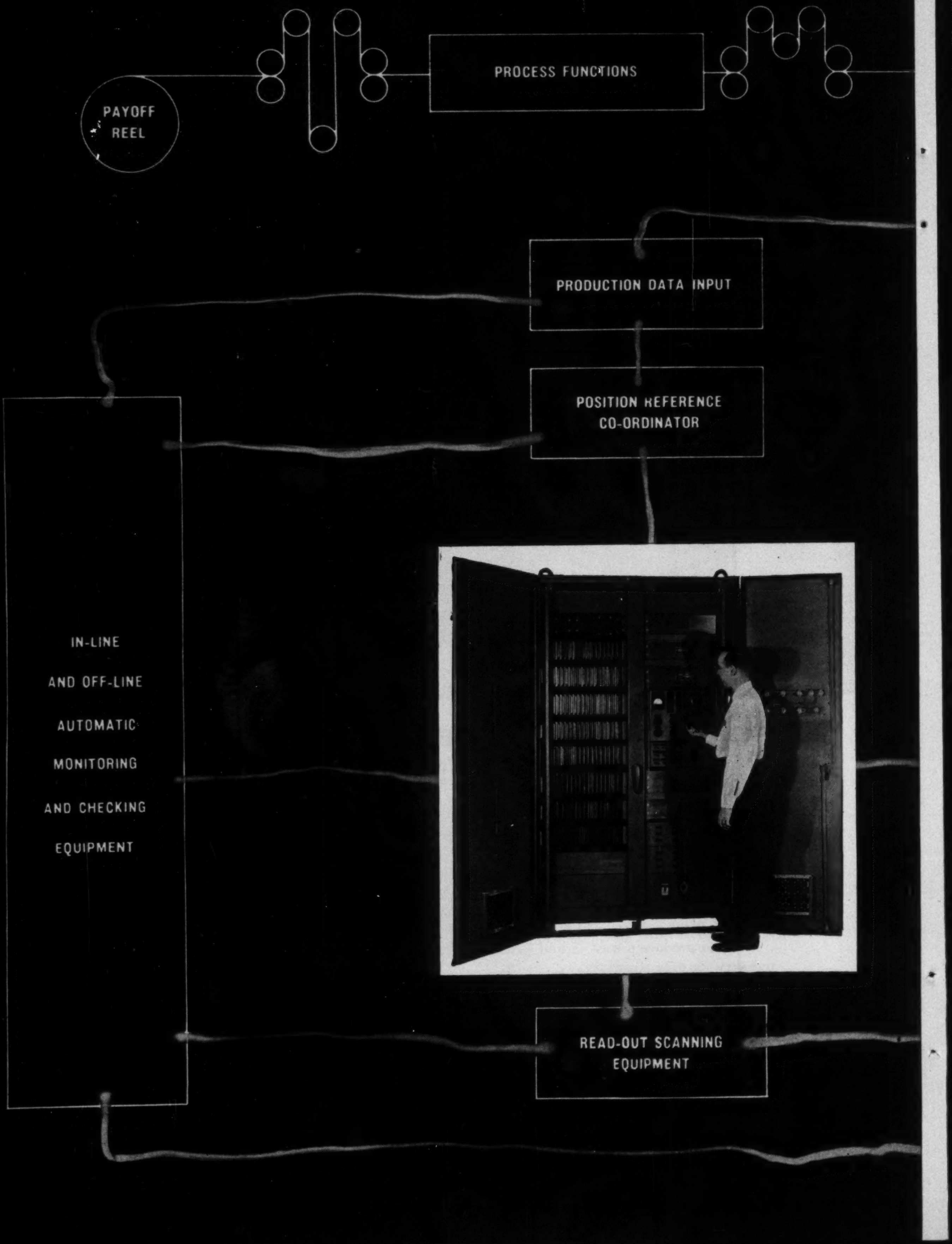
We also produce a vast line of platinum products and chemicals that have been used by industry for over a century.

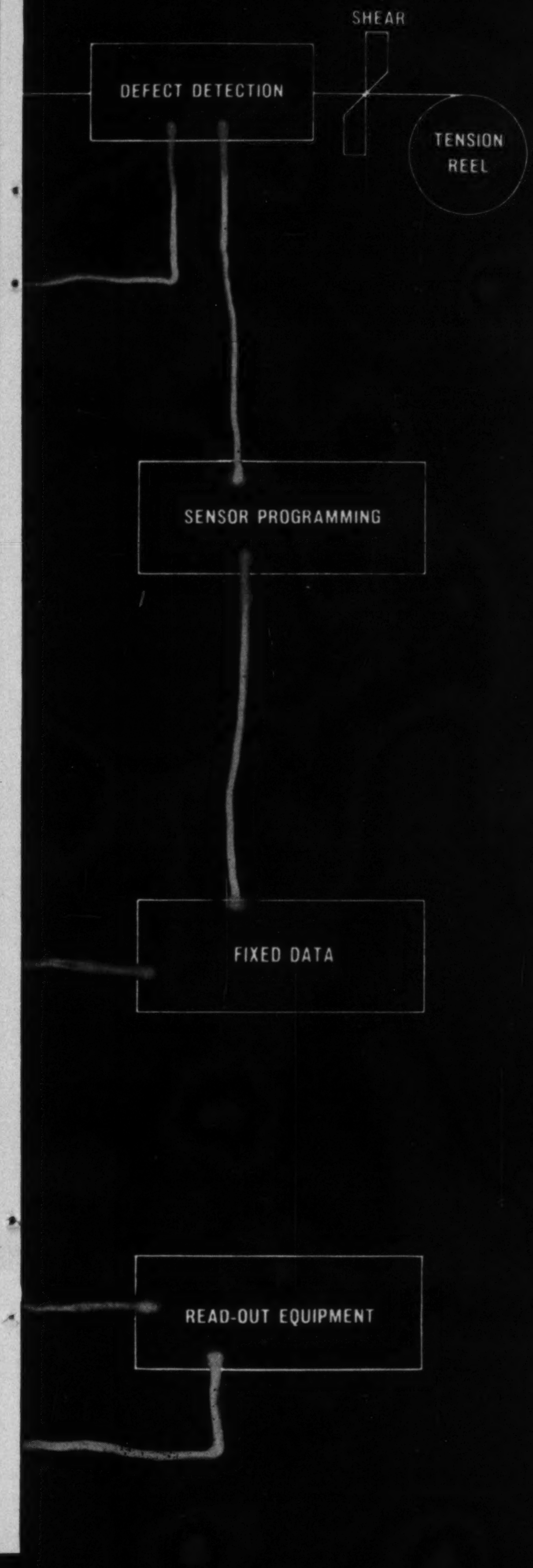
We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. 5 describes our platinum products. Write for them.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 35 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"


PROCESS FUNCTIONS
PAYOFF REEL
PRODUCTION DATA INPUT
POSITION REFERENCE CO-ORDINATOR
IN-LINE AND OFF-LINE AUTOMATIC MONITORING AND CHECKING EQUIPMENT
READ-OUT SCANNING EQUIPMENT



NEW!

PRODAC DATA ACCUMULATOR IS VITAL LINK IN OPTIMIZING STEEL MILL PRODUCTION . . .

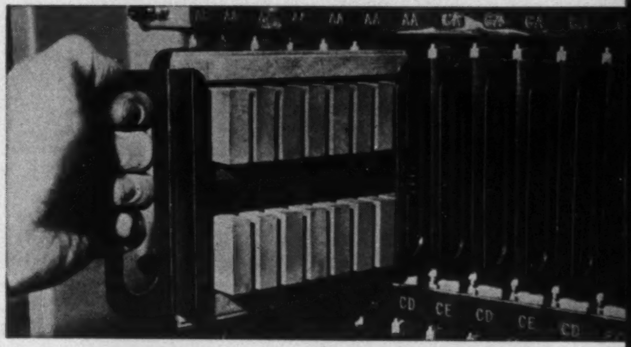
Another Step in Westinghouse Progressive Automation

A large eastern steel mill has found that the completely static-design Prodac* Data Accumulator is providing continuous information and read-out of the product quality of its tin mill products. This installation is providing the basic detailed data that is a prime requisite to the ultimate automatic processing line.

Prodac Data Accumulator Systems provide a complete record of the *product itself*. This record is a natural step in *Progressive Automation* of processing lines, rolling mills and other steel-making operations. The Data Accumulator is fully compatible with most sensing devices, electrical controls and read-out equipment.

For counsel-in-depth on steel mill drive systems application, call your Westinghouse sales engineer. He'll show you how you can economically apply step-by-step *Progressive Automation* to boost product quality, cut costs in your plant. For more information about Prodac, call Westinghouse or write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-96147

YOU CAN BE SURE...IF IT'S
Westinghouse



This withdrawn module represents a circuit function. It is easily accessible for removal or replacement.

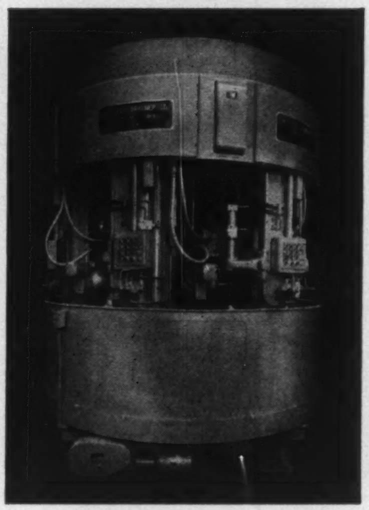
*Trade-Mark

How long is it

FROM GOLDEN OPPORTUNITY...

50

TO GOLDEN ANNIVERSARY ?



Time-wise it is fifty years. Fifty of the most exciting, progressive years in our nation's history.

From a technical standpoint it appears much longer, so tremendous are the changes that have been wrought in the machine tools of today vs. those of yesteryear.

Men of vision incorporated the Lees-Bradner Company in October of 1909. They recognized the need for better cutting machines and grasped their golden opportunity to improve gear generating methods. Men of vision have carried on ever since, perfecting those early machines and winning for Lees-Bradner the most respected position in the hobbing machine industry.

Yes, we're fifty years young—and growing younger every year with fresh, new ideas that multiply the efficiency of Lees-Bradner machines.

Many thanks to our thousands of good customers who, years ago and since, gave us the "golden opportunity" to reach this, our "golden anniversary."

See the new Lees-Bradner 12-HD and the efficient 7-HD Hobbing Machines at the Machine Tool Exposition BOOTH No. 481

IMPROVING GEARS... FOR 50 YEARS!

the
LEES-BRADNER
Company
CLEVELAND 11, OHIO, U.S.A.

Stop looking for spring wire in large coils…it's here (*courtesy of Roebling*)

This is really an enormous availability — 3000 pounds of high carbon spring wire in a single, nonstop coil. You know what this means. Uninterrupted productivity. You make more of your products faster and, as with *any* length of Roebling spring wire, you make them better.

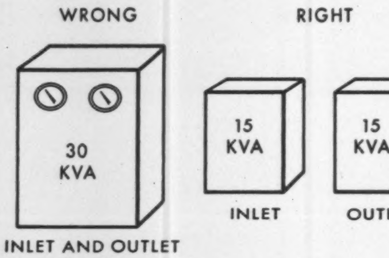
This, of course, is in addition to the already wide selection of Roebling wire in all kinds of sizes and gauges. Whatever you specify in spring wire — for quality — the word that comes first is Roebling.

For information on *any* size coil, ask Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

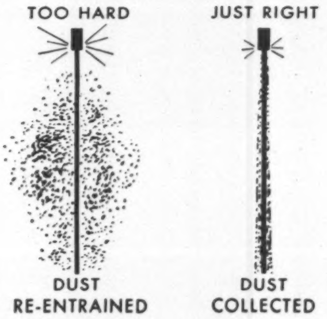
ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

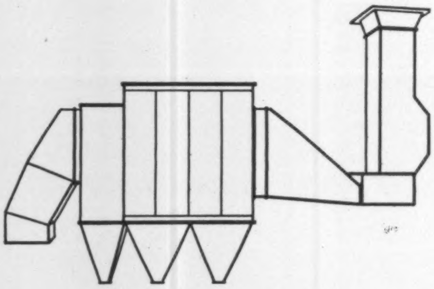
How to Evaluate Cottrell Precipitators



1. Electrical Sets should be arranged and rated to suit best the requirements of a specific job. Since electrical conditions can vary widely at different parts of the precipitator, it is good design to include several electrical sections in series, energized from separate sets so that each section may be energized as needed. Sets should be sized according to the amount of power the precipitator can absorb. A large excess of installed power, which will never be absorbed, means inefficient use of its equipment.

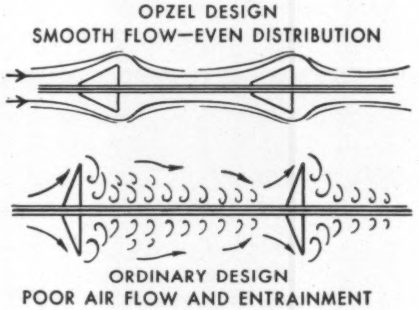


3. Rapping Intensity. Rappers should have easy means to vary the intensity of the blow to suit variations in operating conditions. A pre-set intensity setting cannot possibly give proper rapping over the normal range of operation. If too soft, build-up will occur which will disturb electrical conditions. If too hard, there will be reentrainment. Means of intensity adjustment are necessary to avoid drop-off of precipitator efficiency as conditions change.



3 DIMENSION MODEL

2. Gas Distribution. Remember that gas distribution, gas baffling, and provision against hopper sweeping all have a large influence on collection efficiency. The gas flow system should be analyzed as closely as possible, both in the precipitator and in the associated duct-work. If in doubt, have a three-dimensional gas flow study made. Two-dimensional gas flow studies *are not as accurate* and may lead to erroneous conclusions.



4. Baffle Design. Careful attention to the design of baffles on the collecting plates is most important. Small amounts of reentrainment mean tremendous differences in over-all collection efficiencies. It is seen that the "quality" of the collecting surface is far more important than quantity—quantity (sq. ft. of surface or treatment time) in itself is not a criterion of performance.

The point of all this is that so many factors enter into evaluating an electrical precipitator that you should consult with the leading manufacturer—Research-Cottrell

Research-Cottrell, with over 1198 years of combined engineering skill and experience, is the undisputed leader in electrical precipitation.

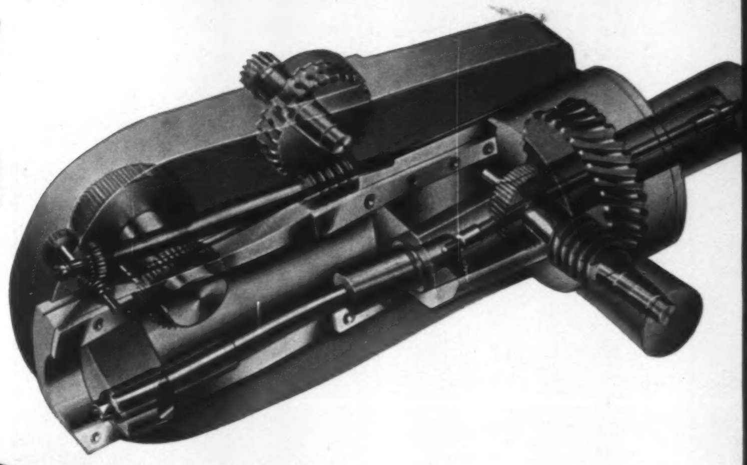
Research-Cottrell

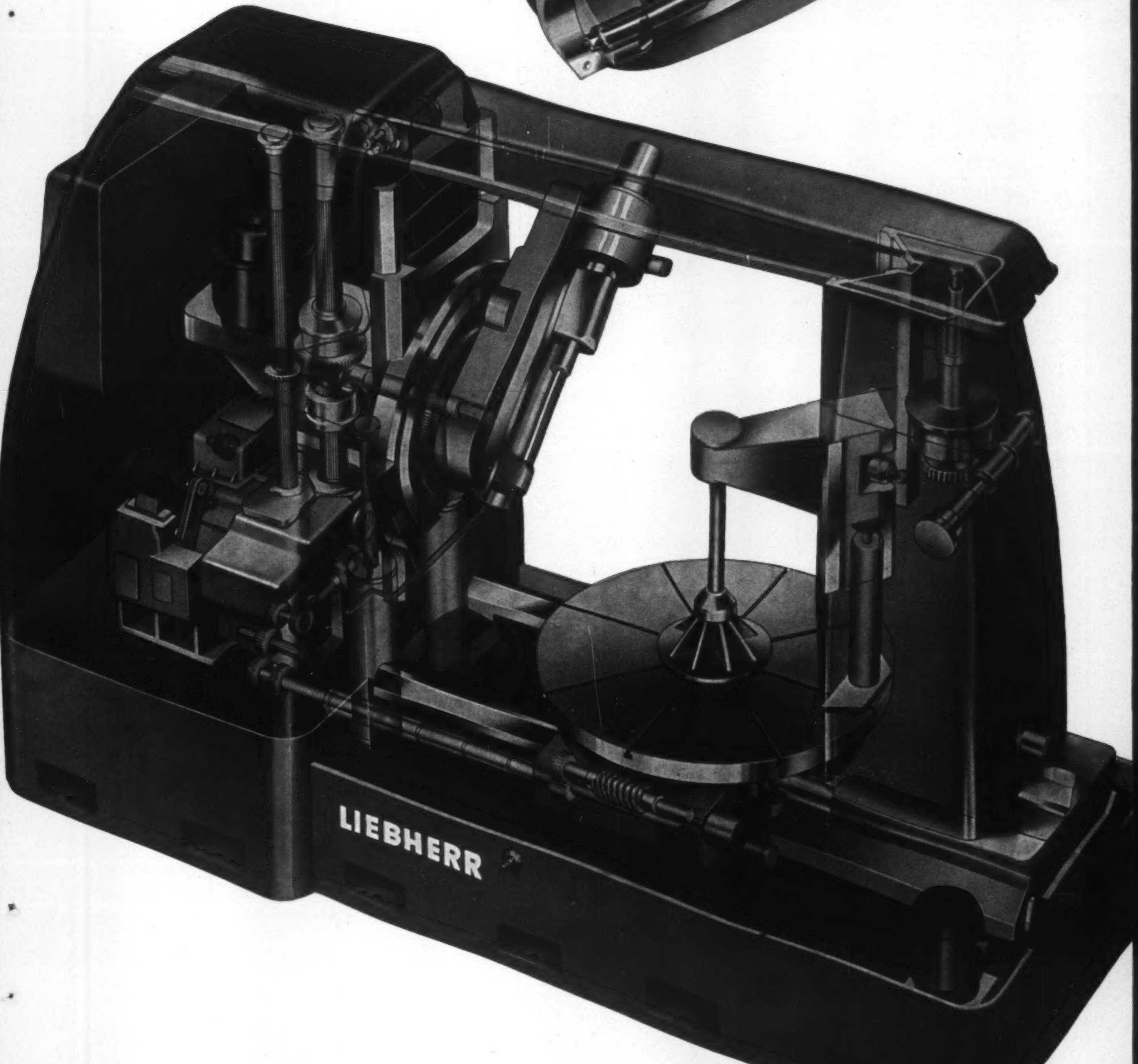
RESEARCH COTTRELL INC.
TRADE MARK

RESEARCH-COTTRELL, INC., Main Office and Plant: Bound Brook, N. J.
Representatives in principal cities of U.S. and Canada

RC 204

HERE'S HOW THE LIEBHERR GEAR HOBBER WORKS





to see it at work—turn the page.................

Did you spot these gear hobbing features on the preceding page?

They're all yours—only in a LIEBHERR

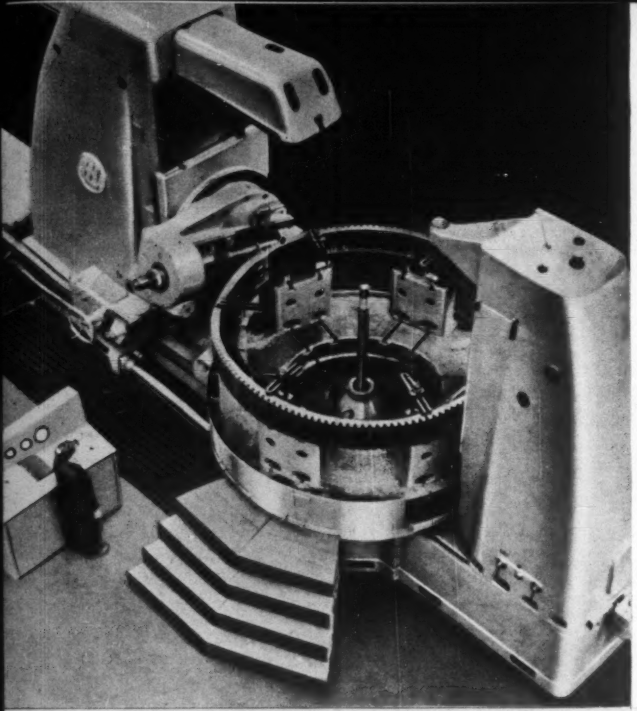
1 **WARD-LEONARD AC-DC MAIN DRIVE** provides infinitely variable hob speeds with maximum torque and highest cutting efficiency at all operating speeds.

2 **SHORTEST AND MOST DIRECT DRIVE FROM MAIN MOTOR TO HOB SPINDLE** delivers 70% of motor's power to hob where it is needed most.

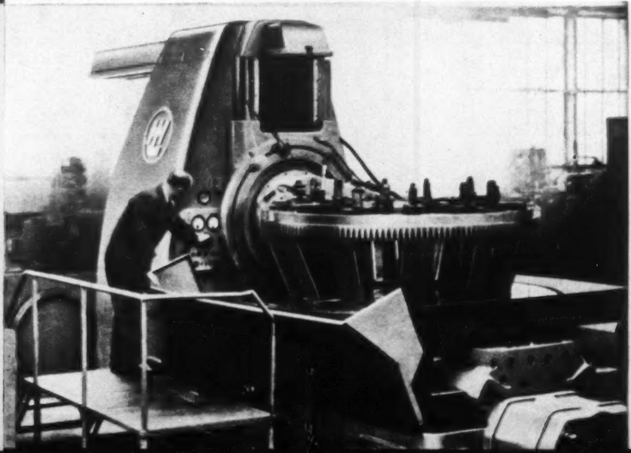
3 **BALANCED HOB SLIDE DESIGN**—main motor acts as counterbalance to hob slide.

These are just a few highlights of the advanced design that distinguishes LIEBHERR GEAR HOBBERS and explains why they are in the forefront of production gear hobbing—here and abroad. There are a dozen more reasons—every one illustrated in detail in our 36-page catalog. We think you'll be interested in evaluating every one of them in terms of your present or projected gear cutting procedures. May we send you a copy?

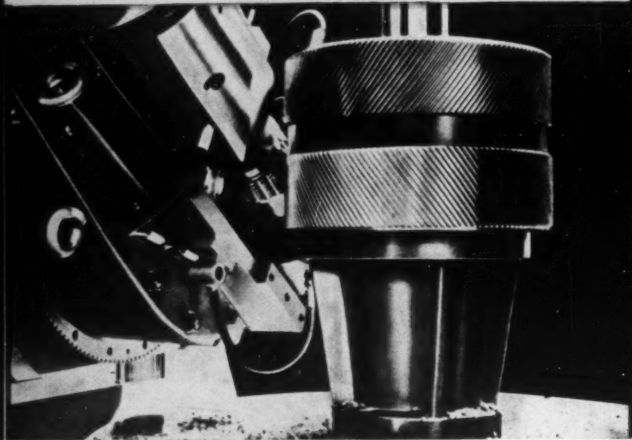
Ten Liebherr models range from 12" to 150" diameter



▲ Hobbing a helical ring gear on Model L-3200



▶ Hobbing a radar rim gear on Model L-1800



KURT ORBAN
COMPANY, INC.

34 Exchange Place, Jersey City 2, New Jersey

F 1002 200 4.60 Jo

Printed in Western Germany

ONE STOP FOR LATHES+

MMT-PE at the

Machine Tool Exposition

NEW
4025
NK Design
Heavy Duty
Lathe

NEW
2516
NE Design
Heavy Duty
Lathe

NEW
2013
Numerically
Controlled
Lathe

NEW
2013
NE Design
Heavy Duty
Lathe

NEW
13"
Regal
Lathe

NEW
15"
Regal
Lathe

NEW
17"
Regal
Lathe

NEW
19"
Regal
Lathe

NEW
15"
Variable
Speed
Dual Drive
Lathe

NEW
6 PC
Crankshaft
Lathe

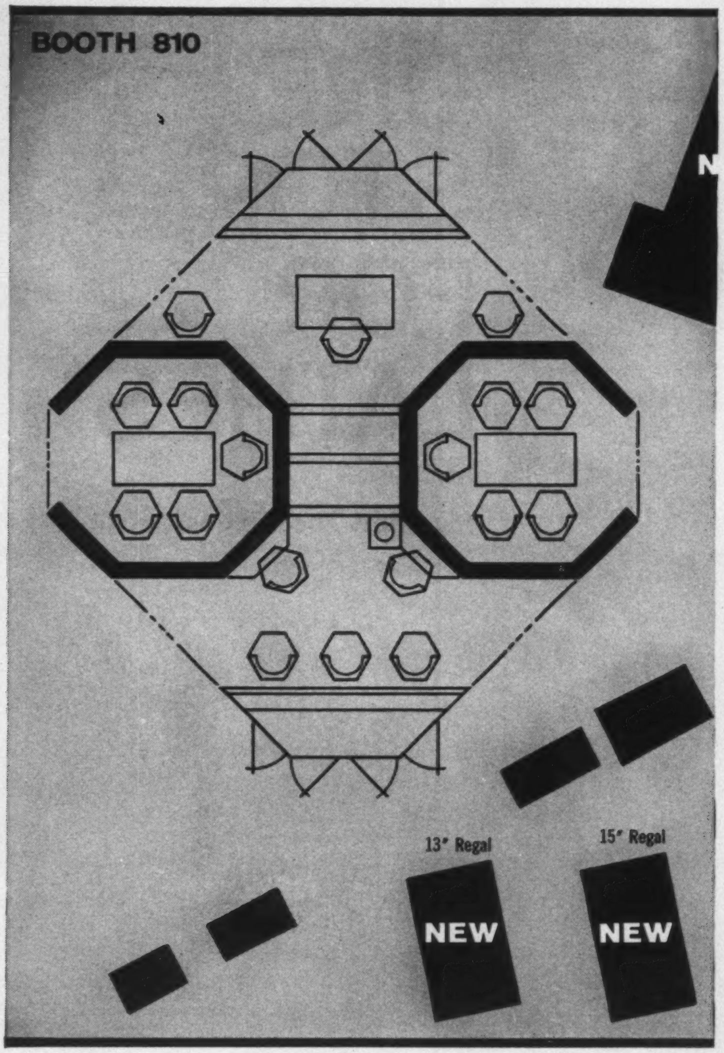
NEW Rapid Borer
Special 20" High Speed Lathe
and Other LeBlond Lathes

SEE LEBLOND IN BOOTH 810 • SEE LEBLOND IN BOOTH 908 • SEE LEBLOND IN BOOT

ONE STOP FOR LATHES

at the

Machine Tool Exposition



Wherever you find lathes—in production, maintenance, toolroom and classroom—you will find LeBlonds doing a magnificent job. LeBlond is the world's largest builder of a complete line of lathes.

Choose the REGAL line for low priced lathes with big lathe features. These favorites for light production, maintenance, instrument work, training, and the toolroom are made in 15 different models from 13" to 24".

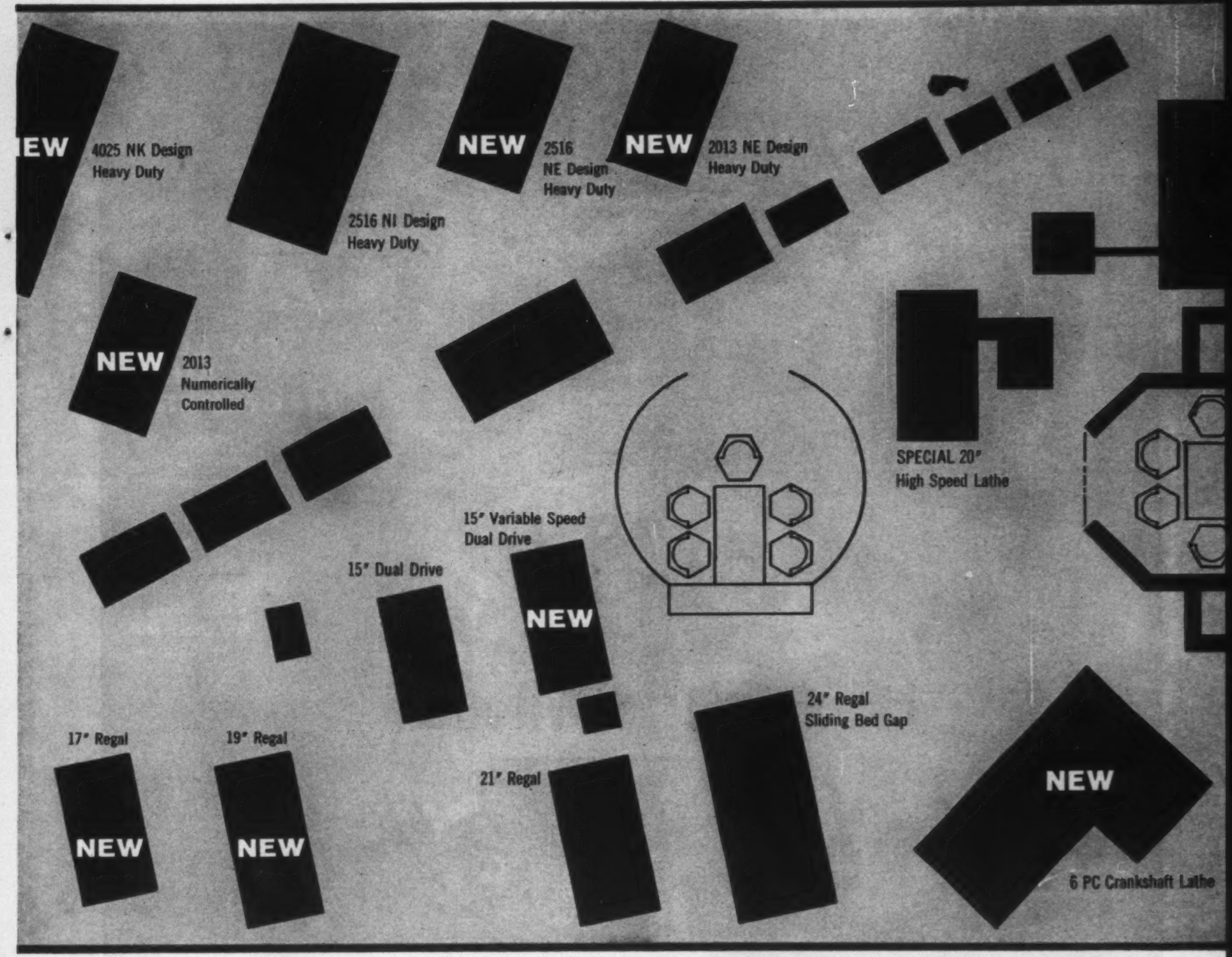
Look to the HEAVY DUTY line for rugged lathes for peak performance and round-the-clock production. The choice of production departments and tooling programs, LeBlond Heavy Duties are made in 6 different series from 13" to 120".

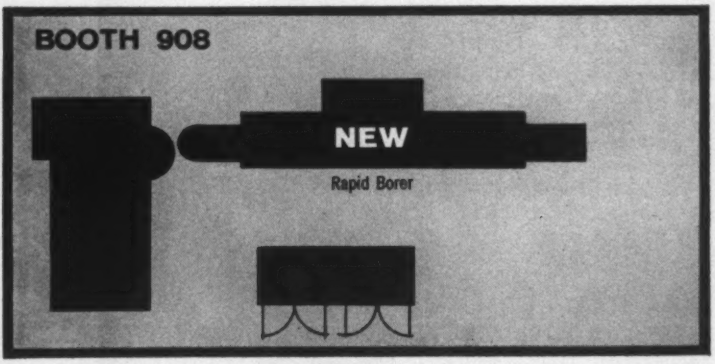
Rely on the RAPID PRODUCTION line for specialized small lathes designed for mass production of specific workpiece categories. Often used with form tooling, they are made in three different models.

LeBlond builds many of these fine lathes in toolroom, plain bed gap, and sliding bed gap models. They may be fitted with a full line of accessories, including *four* different tracers: Regal-Trace, Hydra-Trace, Two-Directional, and 90°, all made by LeBlond.

Sound engineering with ingenuity, three-quarters of a century of experience, a history of notable contributions to better lathe design—these are reason why we say, "With LeBlond, you cut with confidence!"

10 • SEE LEBLOND IN BOOTH 908 • SEE LEBLOND IN BOOTH 810 • SEE LEBLOND I


EW
4025 NK Design
Heavy Duty
2516 NI Design
Heavy Duty
NEW
2516
NE Design
Heavy Duty
NEW
2013 NE Design
Heavy Duty
NEW
2013
Numerically
Controlled
SPECIAL 20"
High Speed Lathe
15" Variable Speed
Dual Drive
15" Dual Drive
NEW
24" Regal
Sliding Bed Gap
17" Regal
19" Regal
21" Regal
NEW
NEW
NEW
6 PC Crankshaft Lathe


BOOTH 908
NEW
Rapid Borer

Cut with confidence

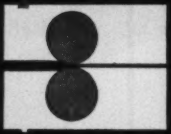
LEBLOND *of Cincinnati*

The R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio

N BOOTH 908 • SEE LEBLOND IN BOOTH 810 • SEE LEBLOND IN BOOTH 908 • SEE

COLD HEADING MACHINERY

Cold Headers • Parts Formers • Nut Formers • Slotters • Threaders • Pointers • Trimmers and other Cold and Hot Forming Equipment



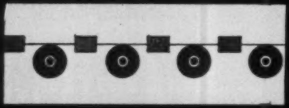
ROLLING MILL MACHINERY

Two-High and Four-High Mills • Special Mills • Sendzimir Mills • Rod Mills • Slitters • Coilers • Winders • Straighteners • Payoffs • Edgers • Coil Boxes • And Other Mill Equipment

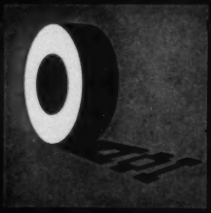
WATERBURY
MACHINERY BUILDERS
FARREL

WIRE MILL EQUIPMENT

Continuous Tandem And Upright Cone Wire Drawing Machines • Bull Blocks • Wire Flattening Mills •



Swagers • Roll Pointing Machines • Spoolers • And Other Wire Equipment

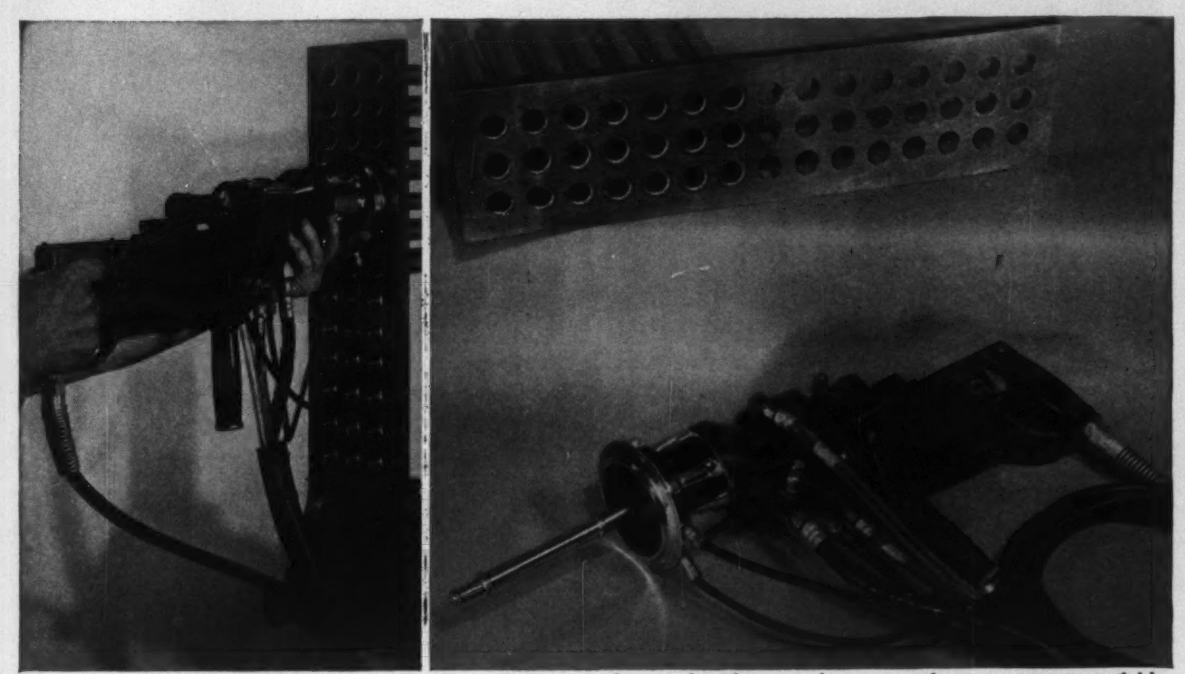


POWER PRESSES

Cam and Crank Eyelet Machines • Horizontal Redraw Presses • Multiple Plunger Pillar Presses • High Speed Blanking Presses • Collapsible Tube Equipment • Ammunition Machinery, etc.

THE WATERBURY FARREL FOUNDRY & MACHINE CO.
DIVISION OF TEXTRON INC.
Waterbury, Connecticut • U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

WF-51R



Above, left: Automatic welder is easy to handle and operate. *Above right:* Close-up of one type of automatic unit available for welding tubes to tube sheets. Note uniformity of sample welds above.

Mechanized welding process makes the permanently tight heat exchanger tube joints needed in modern power plants

The design and operation of modern steam power plants require that tubes in condensers and feed-water heaters be installed permanently tight to prevent contamination of the boiler water.

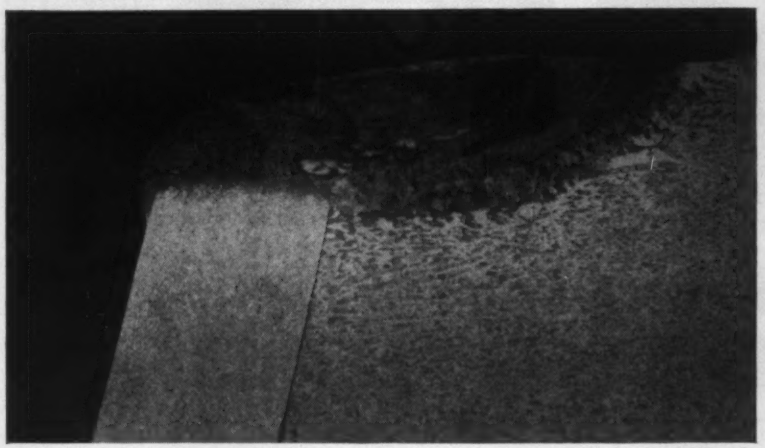
Welding the tubes to the tube sheets will insure this. In most cases, however, welding cannot be done manually for a variety of reasons. A mechanized process must be employed to produce consistently high quality joints.

Inert-gas tungsten-arc (TIG) welding has the advantages of simplicity, good control, and protective shielding without the use of flux. Tough, dependable equipment for automatic welding with this process—such as that shown in the illustrations above—is widely available. These units make it possible to weld, without the complication of filler-metal addition, most of the tube and tube sheet combinations employed in condensers and heat exchangers.

Joints, whether a few hundred or several thousand in number, are uniform in geometry and quality. Typical are the results obtained with tubes of Arsenical Admiralty-439 on tube sheets of Naval Brass-450, as shown in the 20X micrograph reproduced at the left, below.

Technical Assistance: The Metallurgical Department of The American Brass Company will gladly help you in the selection of suitable alloys and in welding procedures and the design of joints. This service is available without obligation. See your American Brass representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

6082

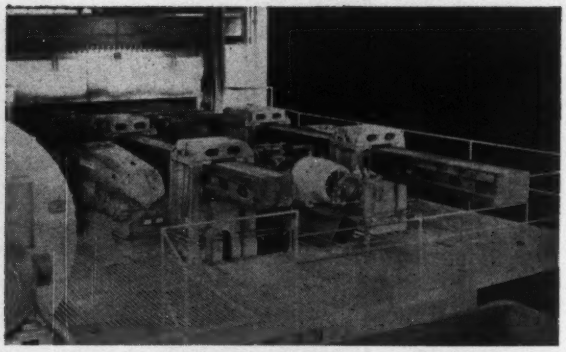


Micrograph 20X of typical weld section. Tube is of Arsenical Admiralty-439 and tube sheet is of Naval Brass-450.

ANACONDA®

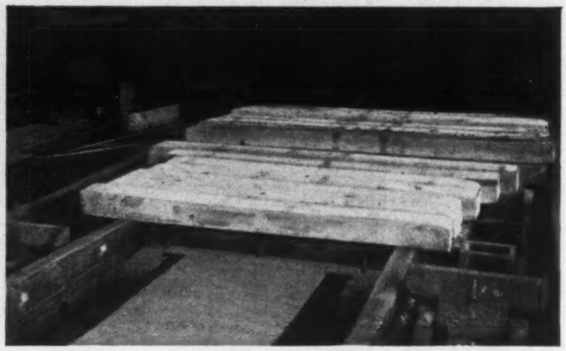
TUBES and PLATES for
CONDENSERS and HEAT EXCHANGERS
Made by The American Brass Company

Ram type furnace pusher at shop assembly, made for double or single row pushing of end charged furnace.



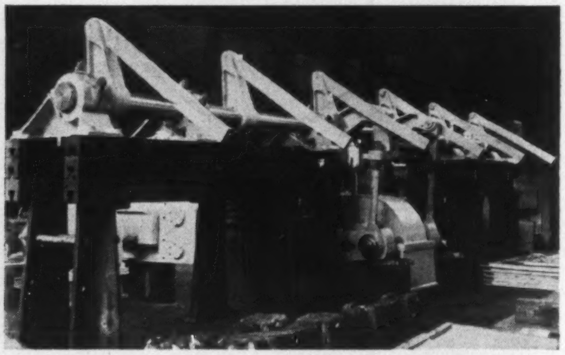
Ram type pushers with clutch for pushing single or double rows of 12" x 12" blooms in end charging furnace.

Single hydraulic type pusher. Billets are charged on raised skids by crane and turned down in front of dogs.



Double dog type furnace pusher. Blooms are placed directly on feeder bed by crane. First set of dogs advances blooms to pushing position. Second set of dogs pushes blooms through furnace.

Slab furnace pusher with depiling magazine. Crane places pile directly in magazine and pusher strips slabs off the bottom and pushes into furnace.



Bar type pusher for pushing side charged furnace.

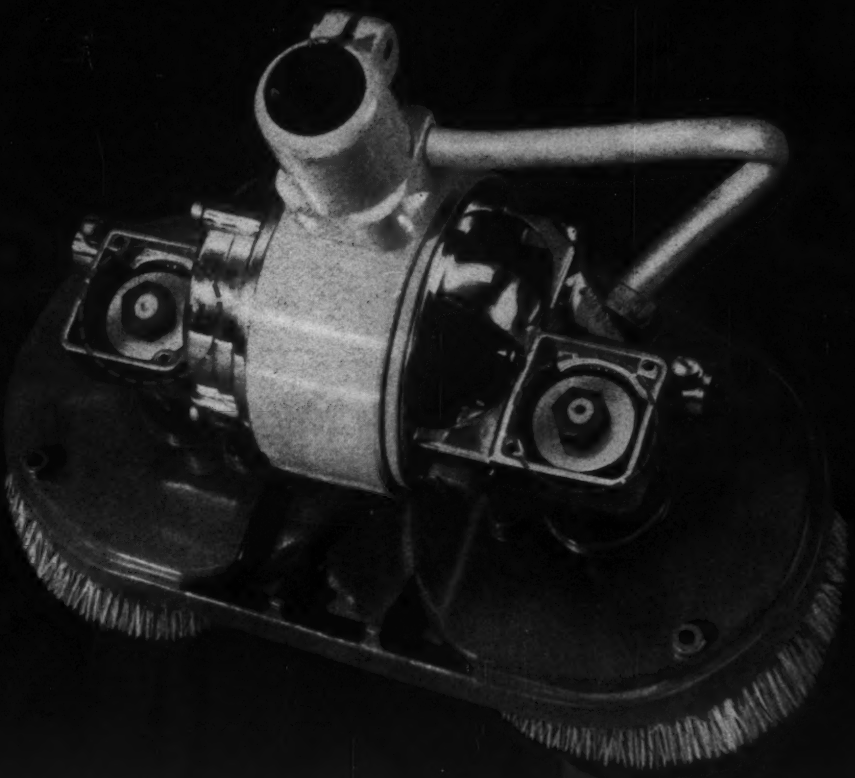
Furnace Pushers by

BIRDSBORO

CORPORATION

MM 86-60

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS
ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL • **BIRDSBORO, PENNSYLVANIA**



Worm gears for Regina Corp. floor polisher, are cast of Asarcon 1010B.

New free-machining phosphor bronze
for longer wearing gears and bearings

ASARCON® 1010B

Continuous cast Asarcon 1010B has unique wearability under tough conditions, outlasting conventional gear bronze in performance by as much as 35%! It is an easy machining alloy, allowing higher speeds and feeds, fewer machining and finishing operations, reduced tool wear, and greater production per tool change.

Asarcon 1010B is one of many bronze alloys available in rods, tubes and special shapes, in continuous lengths up to 16 feet, diameters up to 9", within 1/32" of finished part, and the castings are guaranteed free of sand, porosity, blow-holes and other common casting defects. Write for complete information to Continuous Cast Department, American Smelting and Refining Company, Barber, New Jersey and Whiting, Indiana.

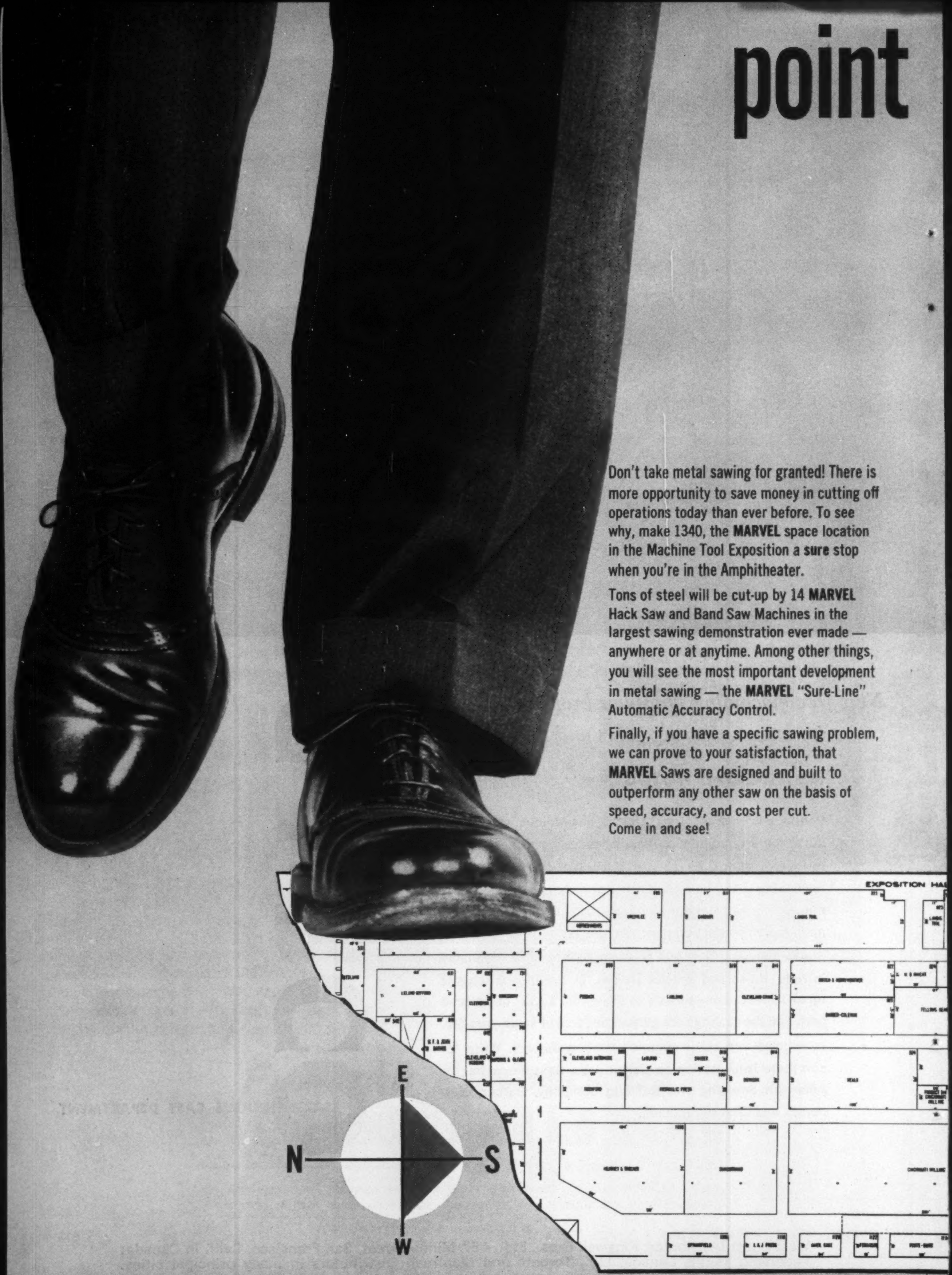
ASARCO

AMERICAN SMELTING AND REFINING COMPANY

CONTINUOUS CAST DEPARTMENT

West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

point


EXPOSITION HA
LELAND-GIFFORD
LANDIS TOOL
CLEVELAND CRANE
BARBER-COLMAN
CLEVELAND AUTOMATIC
HYDRAULIC PRESS
HEALD
CINCINNATI MILLING
SPRINGFIELD
E
N
S
W

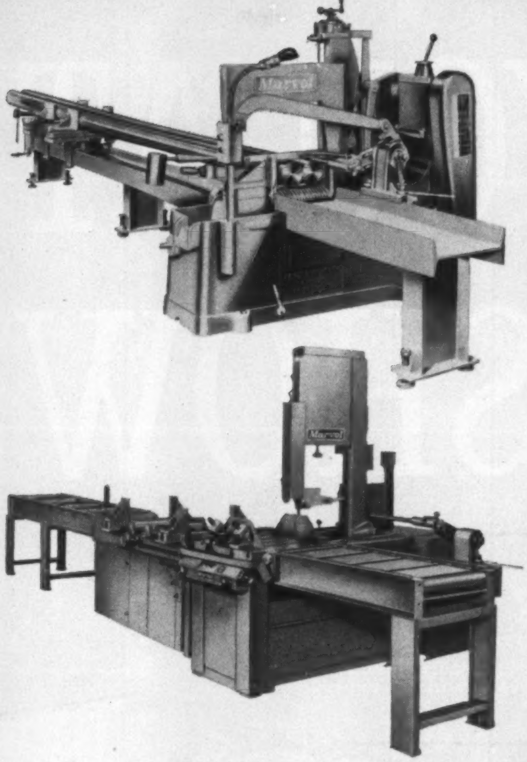
Don't take metal sawing for granted! There is more opportunity to save money in cutting off operations today than ever before. To see why, make 1340, the **MARVEL** space location in the Machine Tool Exposition a **sure** stop when you're in the Amphitheater.

Tons of steel will be cut-up by 14 **MARVEL** Hack Saw and Band Saw Machines in the largest sawing demonstration ever made — anywhere or at anytime. Among other things, you will see the most important development in metal sawing — the **MARVEL** "Sure-Line" Automatic Accuracy Control.

Finally, if you have a specific sawing problem, we can prove to your satisfaction, that **MARVEL** Saws are designed and built to outperform any other saw on the basis of speed, accuracy, and cost per cut.
Come in and see!

your feet south to space

1340



to see the LARGEST, MOST COMPLETE SAWING DEMONSTRATION in the Amphitheater

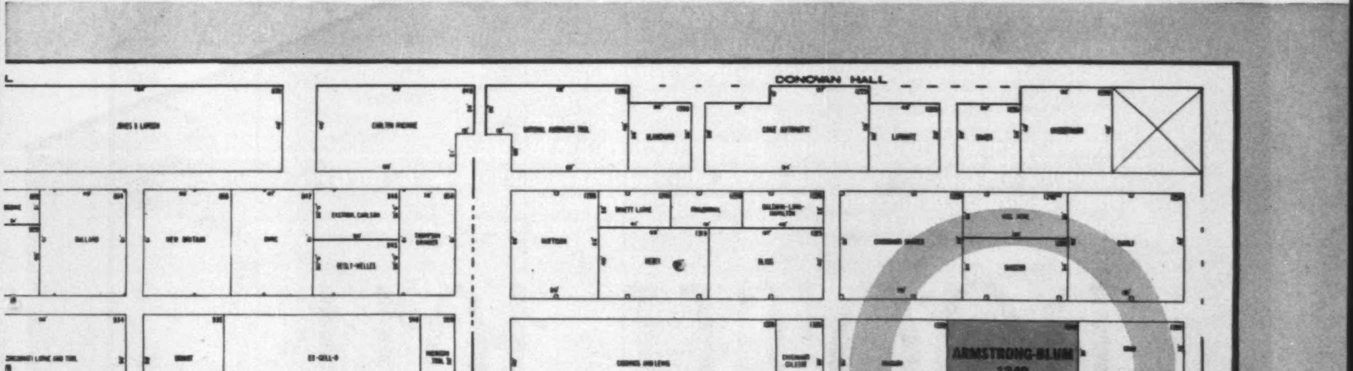
Be sure to see the MARVEL *"Sure-Line"* (patented) AUTOMATIC ACCURACY CONTROL

MARVEL *Metal Cutting* **SAWS**

Better Machines–Better Blades

ARMSTRONG-BLUM MANUFACTURING COMPANY

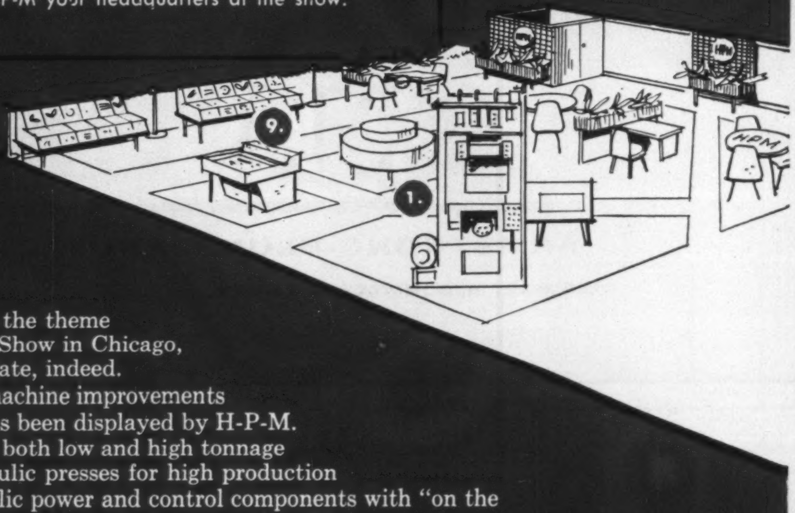
5700 WEST BLOOMINGDALE AVENUE
CHICAGO 39, ILLINOIS


DONOVAN HALL
JONES & LAMSON
NEW BRITAIN
EX-CELL-O
ARMSTRONG-BLUM
1340

MACHINE TOOL EXPOSITION—1960

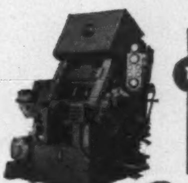
SEE YOU AT THE SHOW

This artist's sketch of the H-P-M display illustrates the depth and scope of our 1960 NMTBA Show exhibit. It's our biggest ever — packed with new machines and exciting modifications of standard equipment you'll want to see. Room for relaxing, too, when the feet give out. Make H-P-M your headquarters at the show.



Production efficiency will be the theme of the H-P-M exhibit at the Show in Chicago, Sept. 6-16. And it's appropriate, indeed. Never before have so many machine improvements or so many new developments been displayed by H-P-M. The items on exhibit include both low and high tonnage press equipment; new hydraulic presses for high production stamping operations; hydraulic power and control components with "on the spot" recording of pressure conditions during operation. It's the biggest and best H-P-M exhibit ever and one you'll want to make sure to see.

BOOTH 1011



A NEW APPROACH TO "SMOOTH EDGE" BLANKING

① Parts ready for assembly direct from the press . . . made on this special, fully hydraulic triple action press, equipped with special die. Speeds up to 120 strokes per minute. See it run with automatic roll feed! Changes in thickness and type of metal made without press adjustment. Push your way through the crowd and *watch it work — at the show.*

② **NEW ELECTRONIC CONTROLS FOR HEAVY DUTY PRESSES.** Dynamic new press control developments adapt standard H-P-M metal-working presses for new speed, efficiency and control. A 200-ton blankholder press adaptable for a wide range of jobs will be displayed. *Push-button efficiency — at the show.*

③ **5-TONS OF AUTOMATED VERSATILITY.** The H-P-M C-Press offers basic automation within the budget of all size shops. The press and table combination puts high speed automation in your shop for countless production needs. *See it work — at the show.*

④ **10-TON SERVO CONTROLLED C-PRESS.** With near magic simplicity, the press ram duplicates every motion of the operating lever. Even force on work may be operator controlled; every motion of the lever corresponds exactly to speed and tonnage requirements. *Try it yourself — at the show.*

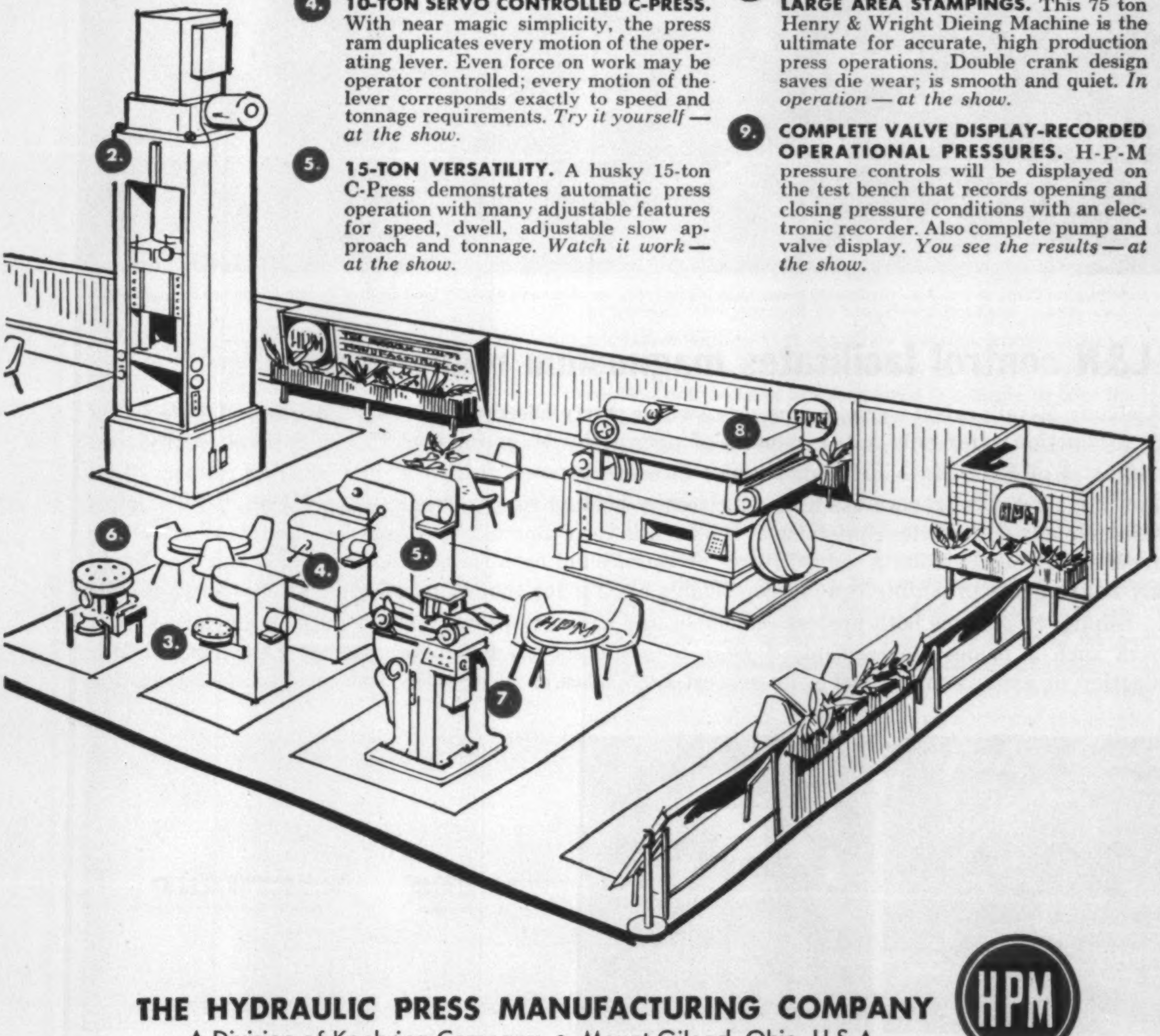
⑤ **15-TON VERSATILITY.** A husky 15-ton C-Press demonstrates automatic press operation with many adjustable features for speed, dwell, adjustable slow approach and tonnage. *Watch it work — at the show.*

⑥ **OPERATIONAL INDEX TABLE CUTAWAY.** See for yourself the features and the functional control of the H-P-M index table. Cutaway viewing permits examination of all moving parts. *For your approval — at the show.*

⑦ **HIGH PRODUCTION HENRY & WRIGHT, 25-TON.** A perfect demonstration of low to medium tonnage productivity with the versatile, high production Henry & Wright Dieing Machine. Fully equipped; a manufacturing man's dream for top quality production. *See it go — at the show.*

⑧ **DOUBLE CRANK PRODUCTIVITY FOR LARGE AREA STAMPINGS.** This 75 ton Henry & Wright Dieing Machine is the ultimate for accurate, high production press operations. Double crank design saves die wear; is smooth and quiet. *In operation — at the show.*

⑨ **COMPLETE VALVE DISPLAY-RECORDED OPERATIONAL PRESSURES.** H-P-M pressure controls will be displayed on the test bench that records opening and closing pressure conditions with an electronic recorder. Also complete pump and valve display. *You see the results — at the show.*

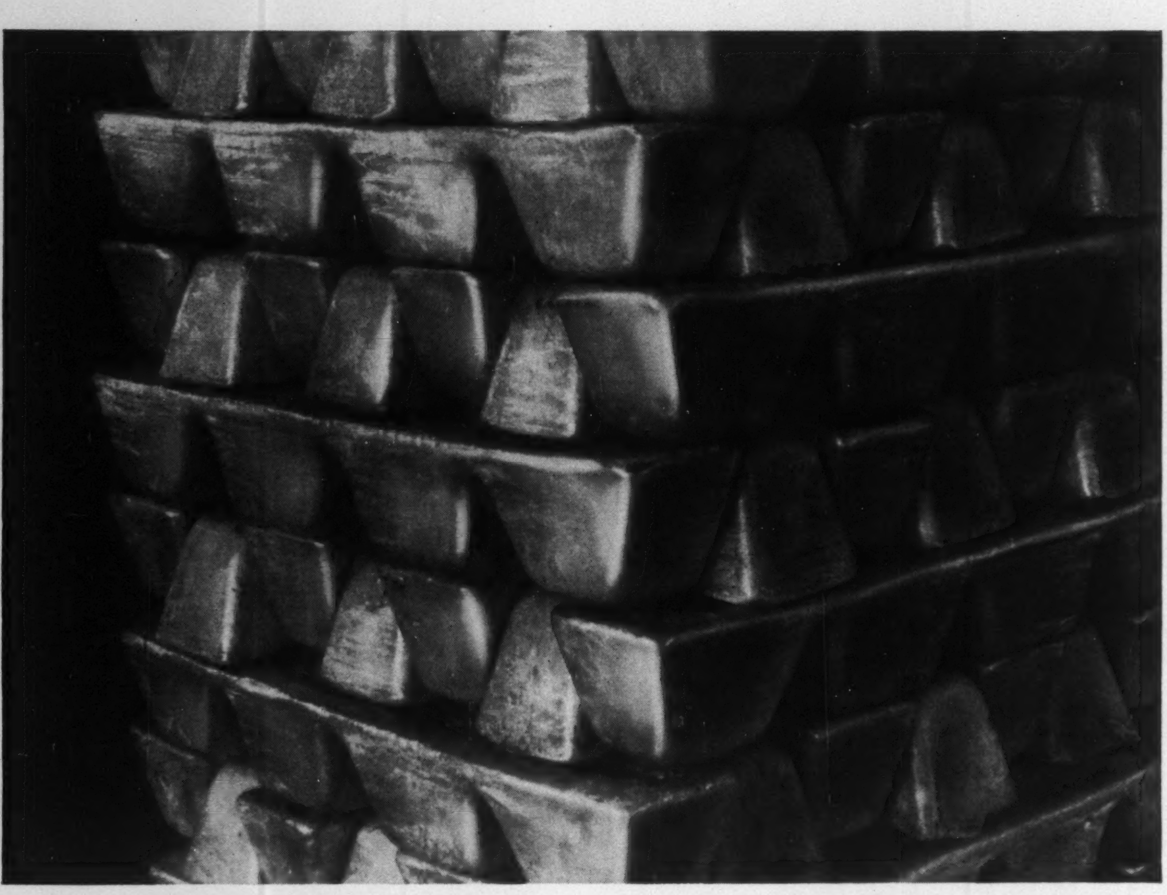


THE HYDRAULIC PRESS MANUFACTURING COMPANY

A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

HPM

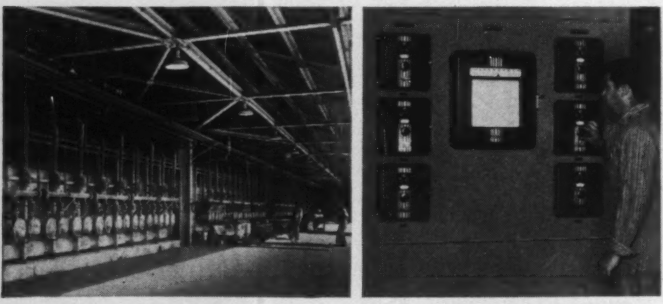
H73



Alabama Metallurgical Corp., Selma, Ala.: High-purity magnesium ingots ready for shipment; ALAMET also produces commercial and alloy grades.

L&N control facilitates magnesium reduction...

. . . at Alabama Metallurgical Corp., Selma, Ala., where thirty Electromax® controllers helped them swing into full production after only a few months of operation. Magnesium at this new plant is produced from briquettes of CaO, MgO, FeSi and CaF_2 which are reduced at 2150 F in evacuated retorts. Since startup in late 1959, Electromax has been consistently holding retort temperatures within ± 5 F. Additional instrumentation includes Speedomax® H which is recording flue and feed-zone temperatures of the lime burner kiln, and controlling temperatures of magnesium bath for casting into ingot and pig. You'll find L&N instruments providing equally dependable control for thousands of applications where heat is used . . . helping to produce both process economies and a quality product. When such significant savings stem from such a modest investment, *it pays to get the best.* For details about L&N controls for modernization or expansion, contact your nearest L&N office or write 4956 Stenton Ave., Phila. 44, Pa.



With Electromax holding retort temperatures within ± 5 F, Speedomax G multiple-point recorders provide a permanent record of furnace temperatures.

LEEDS LN NORTHRUP
Instruments · Automatic Controls · Furnaces

CLOSER TOLERANCE GEARS IN HALF THE TIME

by *New* RED RING FULL-FORM FINISHING

Mounting the shell-type finishing section at the rear end of a Red Ring Full-Form Finishing Broach.

Finishing section

Internal running gear completed in one pass.

An entirely new concept in broaching precision gears and splines for automotive and aircraft industries has significantly reduced production costs and at the same time materially improved gear quality. Both roughing and finishing are completed in a single pass of the tool.

Broached tooth surfaces are not only true to form but are entirely free of the generating tool marks which are unavoidable with conventional broaching tools. Surface smoothness checks out between 5 and 8 microinches in the direction of broach travel.

The secret lies in the ingenious design of this new Red Ring broach (patents pending). The roughing section generates gear teeth in the conventional manner. Following the roughing teeth is an interchangeable shell-type section having 12 rows of finishing teeth. Each row cuts about 0.00025″ of stock on the full profile of each side of the gear teeth—hence the remarkable tooth surface smoothness attained.

Using this method on a 3.5″ PD, 35 tooth internal running gear, a prominent transmission builder found broach life of the roughing section to be 50,000 work pieces—that of the finishing section, 150,000 pieces.

Write for specific data regarding the application of Full-Form Finishing to your operations,

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING,
GEAR HONING AND ELLIPTOID

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

8348

Synthane makes and fabricates
laminated plastics

Quality is Precision and People and Pride

We make and sell laminated plastic sheets, rods, and tubes. But nearly all of our customers prefer us to fabricate their parts from these materials.

Synthane quality starts with the rigid inspection of incoming raw materials. From this point forward, to the finished laminate, control is the byword. In fabricated parts, too, quality is precision, people and pride. Measuring instruments of all kinds, many of our own design, gauges, precision tools and other specialized equipment all contribute to Synthane quality products. Our people, through years of experience, know how to machine laminated plastics to achieve the dimensions and tolerances you require.

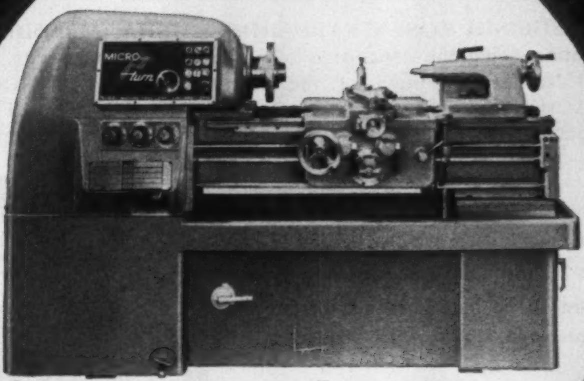
Quality is a matter of pride on the part of every Synthane craftsman who works on your job. And sixty per cent of our people have been with us for 10 years or more.

Aside from the first class job Synthane gives you, it will hardly pay you in money or headaches to do your own machining. Ask your Synthane representative for a quotation. You'll find him in the classified telephone book of any principal city or write Synthane Corp., 56 River Road, Oaks, Pa.

You furnish the print—we'll furnish the part

SYNTHANE
CORPORATION S OAKS, PENNA.
Sheets • Rods • Tubes • Fabricated Parts
Molded-laminated • Molded-macerated

NēBEL MICRO-TURN HIGH SPEED PRECISION LATHE. ENTIRELY NEW TURNING CONCEPT



VISIT BOOTH 1319 – DONOVAN HALL – 1960 MACHINE TOOL EXPOSITION

MODERN MACHINE TOOLS MMT=PE PRODUCTION EFFICIENCY

NēBEL LATHE DIVISION

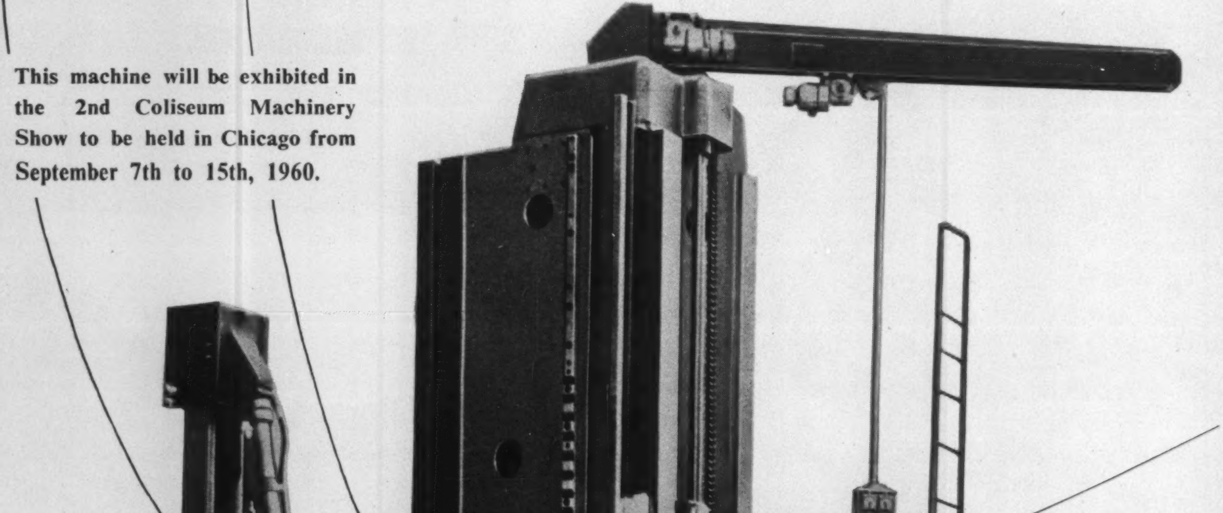
NEBEL MACHINE TOOL CORPORATION • 3415 Central Parkway, Cincinnati 25, Ohio • *Lathe builders since 1899*

MITSUBISHI INNOCENTI CWB

milling boring

MITSUBISHI ZOSEN KABUSHIKI KAISHA (Mitsubishi Shipbuilding & Engineering Co., Ltd.) take pleasure in announcing the conclusion of a license agreement with INNOCENTI S.G. of Milano for the manufacture and world-wide distribution of the universally known INNOCENTI-CWB MILLING, BORING & COMBINED MACHINES. The machines will be produced in Floor Type, Planer Type and other Combination Types, the diameters of spindles being 140 mm for milling and 95 mm for boring.

This machine will be exhibited in the 2nd Coliseum Machinery Show to be held in Chicago from September 7th to 15th, 1960.



Sales Agents :

New York : Mitsubishi International Corp., 120 Broadway, New York 5, N.Y.

Los Angeles : Mitsubishi International Corp., Los Angeles Branch, 606 South Hill St., Los Angeles 14, Calif.

Chicago : Chicago Representative of Mitsubishi International Corp., Room 1803, Prudential Bldg., 130 East Randolph Drive, Chicago, Ill.

Vancouver : Mitsubishi Shoji Kaisha, Ltd., Vancouver Branch, 210 Toronto Dominion Bank Bldg., 717 West Pender St., Vancouver 1, B.C.

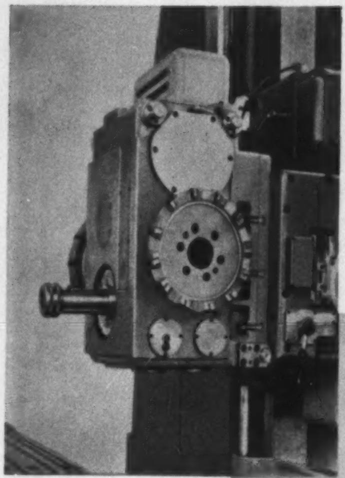
London : Mitsubishi Shoji Kaisha, Ltd., London Branch, 104/106 Leadenhall St., London, E.C. 3

Paris : Paris Liaison Representative of Mitsubishi Shoji Kaisha, Ltd., c/o Mr. G. Bouvet, 5, Rue Boudreau, Paris 9

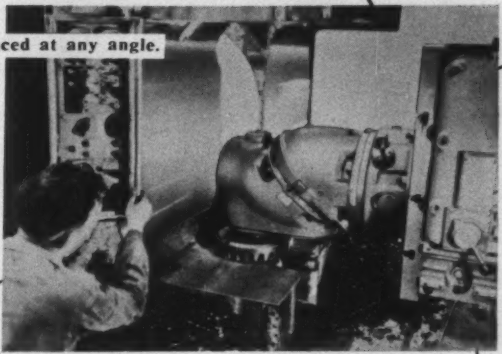
Duesseldorf : Deutsche Mitsubishi Export & Import-Gesellshaft m.b.H., 12 Grunstrasse, Duesseldorf

Melbourne : Mitsubishi (Australia) Pty., Ltd., Melbourne Office, 1st Floor, Houghton House, 543 Little Collins St., Melbourne, C. 1, Victoria

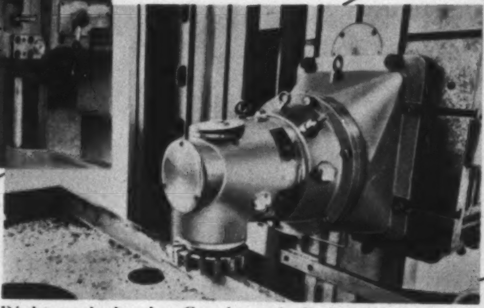
and combined machines



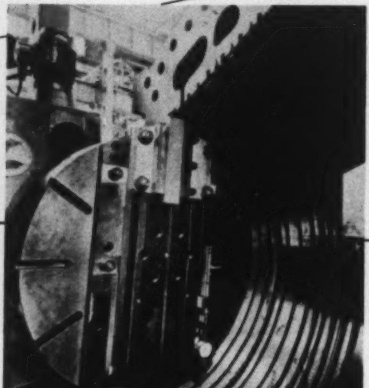
Milling can be done on three faces by the three way head.



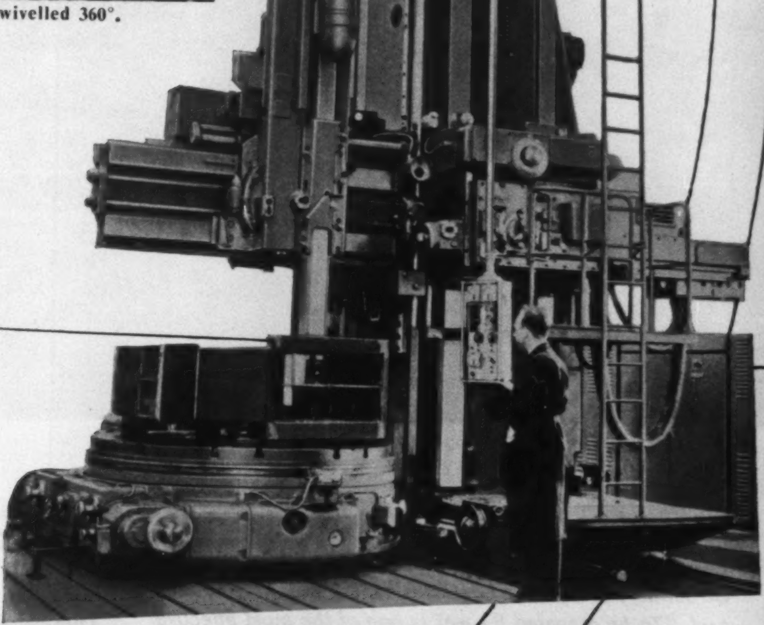
Universal head: Can be placed at any angle.



Right-angle head: Can be swivelled 360°.



Grooves are machined by the turbine head.



When fitted with a rotary table and a removable arm, it can be used as a turning lathe.

MITSUBISHI ZOSEN
(MITSUBISHI SHIPBUILDING & ENGINEERING CO. LTD.)

Head Office: Marunouchi, Tokyo, Japan

Machine Tool Manufacturing Division:

HIROSHIMA PRECISION MACHINE WORKS

Hiroshima, Japan

A message from G. Washington

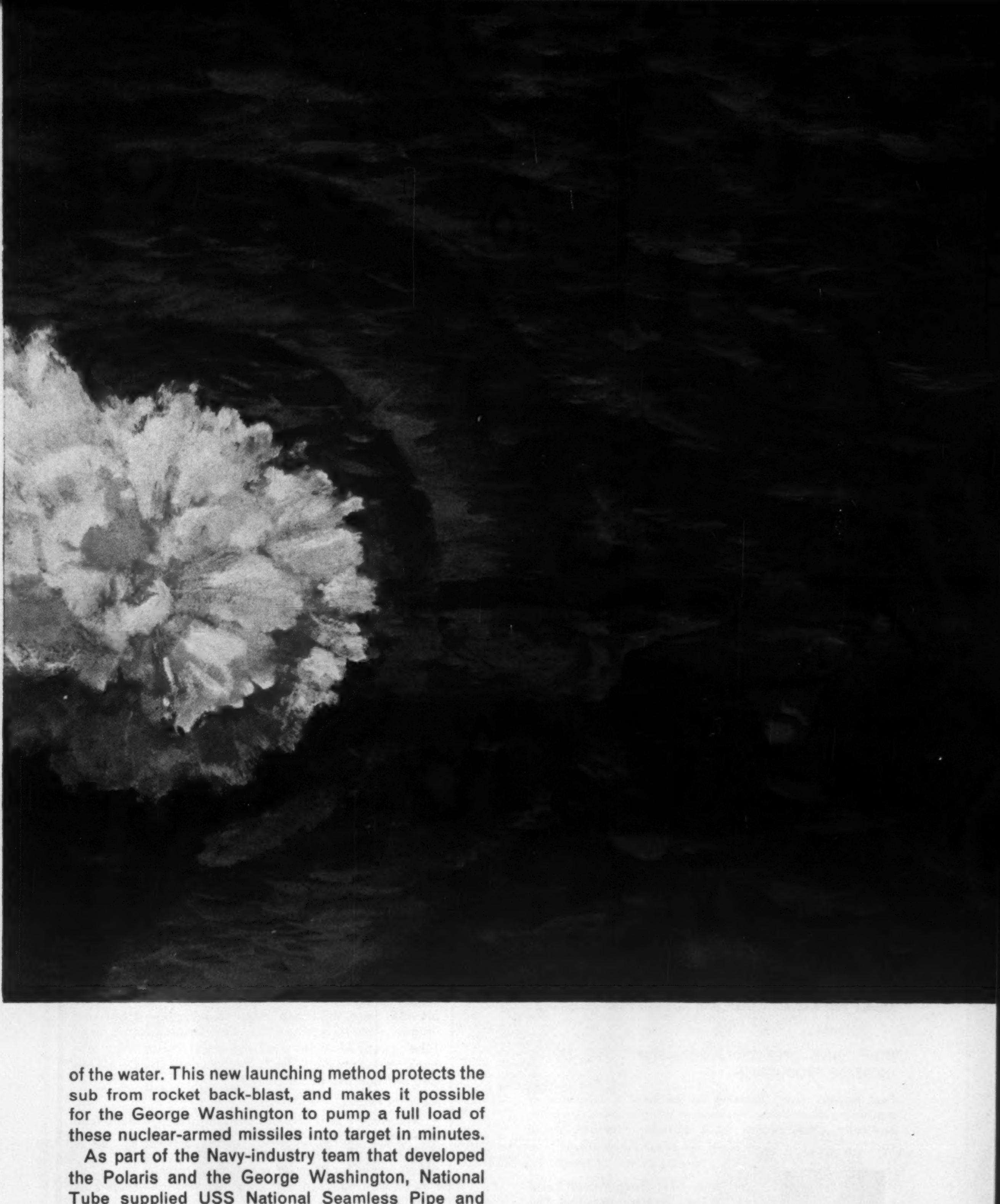
On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

This mark tells you a product is made of modern, dependable Steel.

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear



of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

National Tube
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

BURGMASTER

THE WORLD'S MOST COMPLETE LINE OF

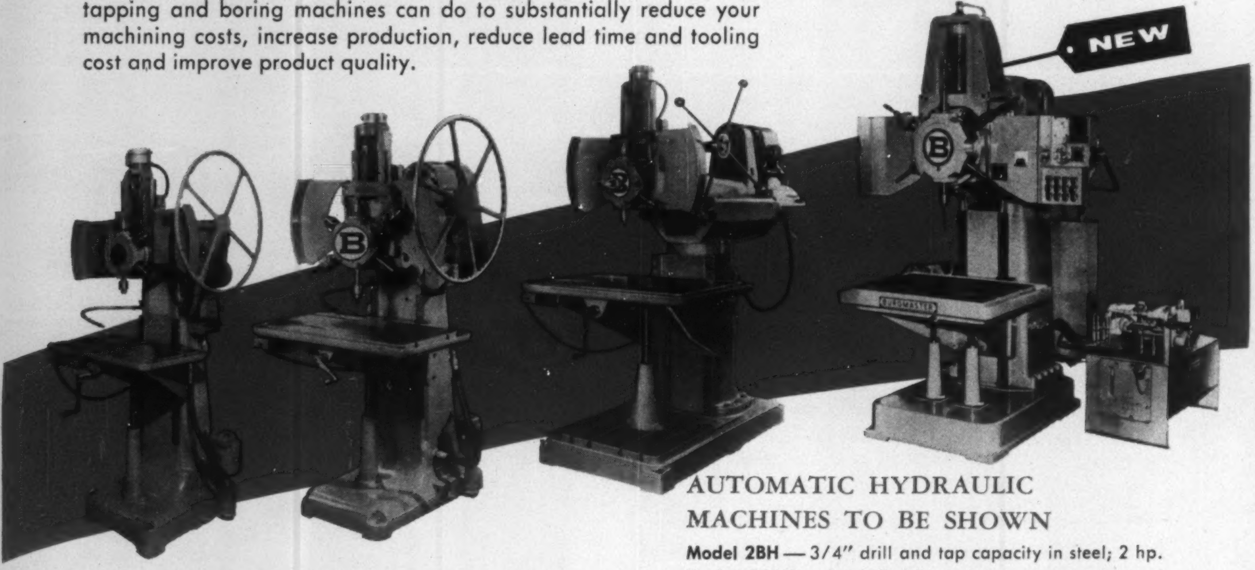
13 Burgmaster machine models will be shown at the Machine Tool Exposition. The many new developments in the Burgmaster line will be introduced by means of actual production demonstratons. Three entirely new Burgmaster models will be introduced and there will also be seven tape controlled Burgmaster machines in operation to show how you can reduce lead time from weeks to hours while increasing production by fully automatic machining.

Be sure and see what the modern Burgmaster line of drilling, tapping and boring machines can do to substantially reduce your machining costs, increase production, reduce lead time and tooling cost and improve product quality.

THE MACHINE TOOL

MMT-pE

Exposition - 1960



AUTOMATIC HYDRAULIC MACHINES TO BE SHOWN

Model 2BH—3/4" drill and tap capacity in steel; 2 hp.

Model 25AH—1-1/4" drill and tap capacity in steel; 7-1/2 hp.

Model 3BH—1-1/2" drill and tap capacity in steel; 10 hp.

AUTOMATIC HYDRAULIC MACHINE FEATURES SET THE PACE FOR FASTER PRODUCTION AND HIGHER QUALITY

Automatic operation determines the pace—one man can operate more than one machine with less effort and fatigue, while increasing production; Simple controls mean faster setups ideal for short run work; Pre-selective infinitely variable spindle feeds, pre-selective spindle speeds and pre-selective depth control.

NEW IMPROVED FEATURES

- Temperature and pressure compensated hydraulic feed—infinitely variable.
- Direct reading rate of feed indicator.
- 4-speed motor drive for wider speed range.
- Reciprocating feed for chip removal on deep hole drilling.
- Forged spindle with gear integral.
- "V" type automatic turret clamping ring.
- Quick-set depth stops.
- Improved lead screw tapping head.

HAND OPERATED MODELS TO BE SHOWN

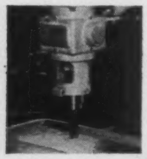
Model 1C—1/2" drill and tap capacity in cast iron; 1 hp.

Model 2B—3/4" drill and tap capacity in steel; 2 hp.

Model 2BR Radial—3/4" drill and tap capacity in steel; 2 hp.

HOW HAND OPERATED BURGMASTER TURRET DRILLS INCREASE PRODUCTION

Fast power turret indexing to perform a sequence of machining operations; Preselective spindle speeds—automatically changed for each spindle; Precision depth control; Quick setup—ideal for short run work.

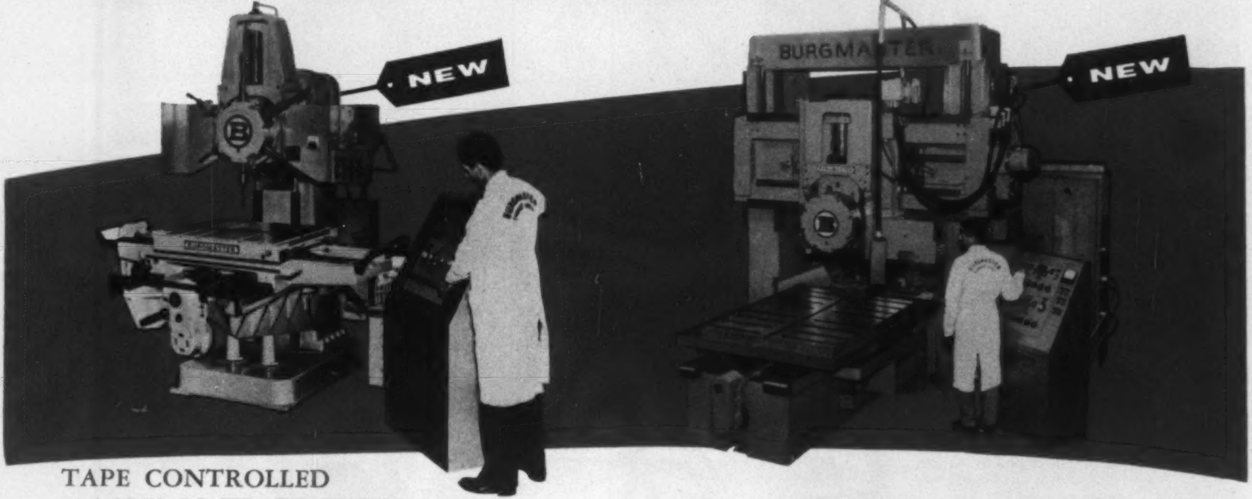


See the new Burgmaster Lead Screw Tapping Head in action. This attachment greatly improves the accuracy and finish of tapped threads and eliminates scrap due to pulled or loose threads.

PRESENTS.....

TURRET DRILLING, TAPPING AND BORING MACHINES

SEE 7 TAPE CONTROLLED BURGMASTER TURRET DRILLS AT THE N-M-T-B EXPOSITITION BOOTH 834



TAPE CONTROLLED MACHINES TO BE SHOWN

Model 2BHT — 3/4" drill and tap capacity in steel; 2 hp; 10" x 18" positioning table; GE 2-axis tape control.

Model 2BHTL — 3/4" drill and tap capacity; 3 hp, 4-speed motor; 15" x 26" positioning table; GE 3-axis tape control.

Model 2BHTL — 3/4" drill and tap capacity; 3 hp, 4-speed motor; 15" x 26" positioning table; Hughes 3-axis tape control.

Model 25AHT — 1-1/4" drill and tap capacity in steel; 10 hp, 4-speed motor; 15" x 26" positioning table; GE 2-axis tape control.

Model 3BHT — 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 20" x 30" positioning table; GE 2-axis tape control.

Model 3BHTL — 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 30" x 45" positioning table; GE 2-axis tape control.

Model 3BHTB — double housing planer type; 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 48" x 60" positioning table; GE 2-axis tape control.

WHAT BURGMASTER TAPE CONTROL MEANS TO YOU

Greatly reduced lead time — get into production in a few hours; Eliminates complex fixtures or index devices. Drill jigs and bushings not required; Much less spoilage on difficult jobs — machine does not depend on operator's skill; Greater accuracy — holds hole location to .001", repeatable to .0005"; Easy to program — 1 minute per hole location; Prepare tape — 4 holes per minute; Set-up machine — 3-5 minutes per tool.

BURGMASTER

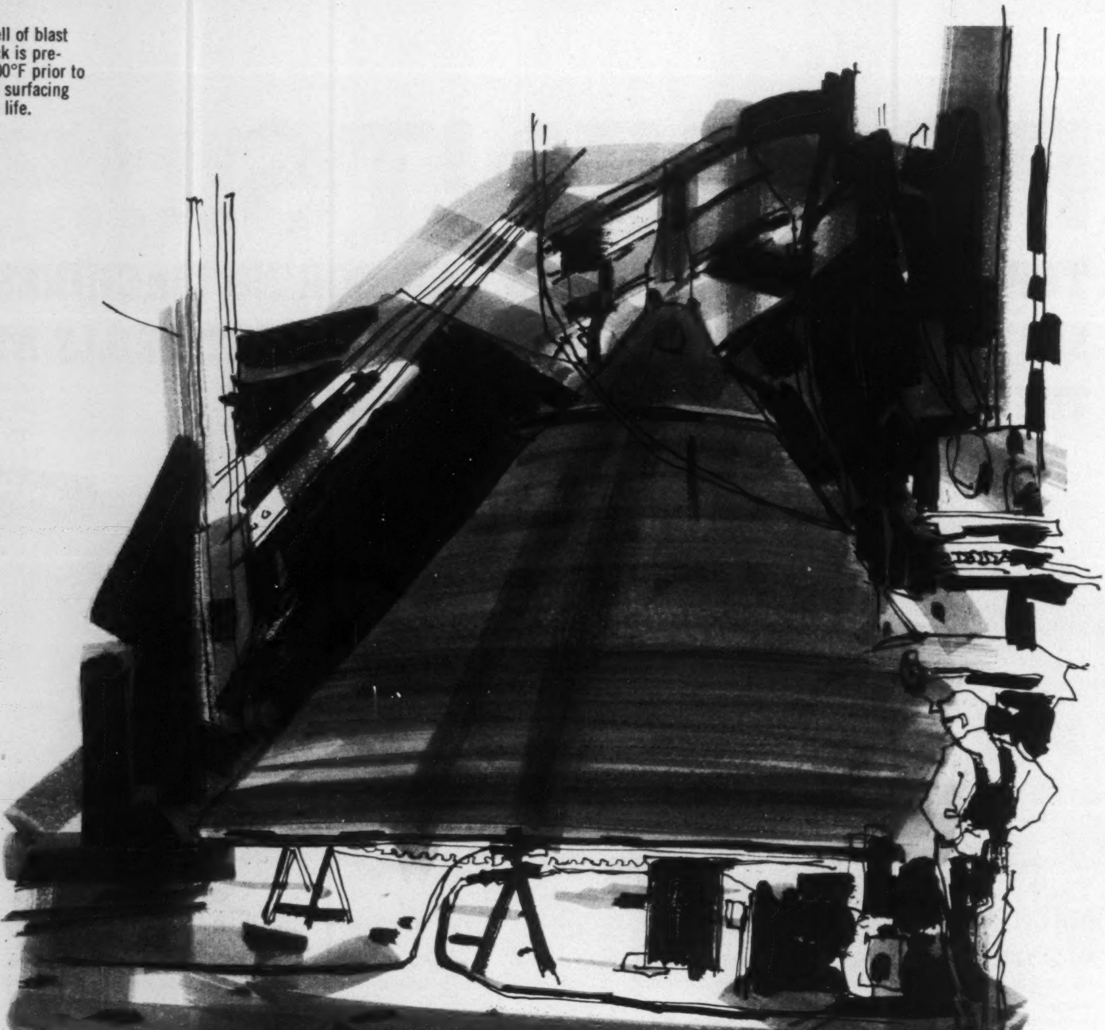
G.E. TAPE CONTROLLED

Write for Bulletin describing the complete line of Burgmaster 6 and 8- Spindle Turret Drilling, Tapping and Boring Machines. Forty minute 16 mm sound film showing all Burgmaster Turret Drills in operation is available without charge.

BURG TOOL **MANUFACTURING COMPANY, INC.**
15001 South Figueroa St., Gardena, Calif.
FAculty 1-3510 • DAvis 9-4158

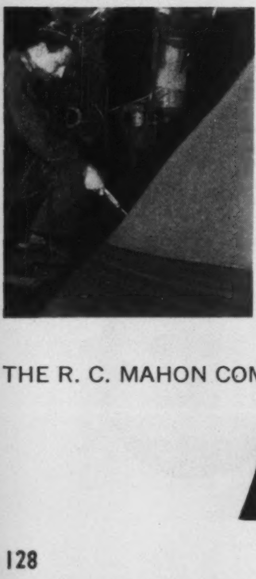
BURGMASTER DIRECT SALES OFFICES: Ridgewood, N.J., 86 North Maple Ave., Gilbert 4-3002 • **Chicago 5, Ill.,** 4908 Lincoln Ave., LOng Beach 1-1178 • **Cleveland 7, Ohio,** 14706 Detroit Ave., ACademy 6-7030 • **Detroit 37, Mich.,** 13730 W. Eight Mile Rd., LIncoln 8-4333 • **San Francisco, Calif.**

Plus dealer representatives in other industrial centers.



■ Giant bell of blast furnace stack is preheated to 400°F prior to Mahon hard surfacing for renewed life.

■ A hard-weld bead is spiraled on to the working area of bell. 'New Surface': 45-50 Rc



MEN WHO KNOW FACILITIES, CAPACITY AND **NEW TECHNIQUES . . .**

BUY **"fabrication by Mahon"**

Mahon's Steel-Weld Division constantly strives for better fabrication techniques—solidly developed out of long experience combined with broad-range facilities and wide-breadth capacity. *Example: new hard-coat (to 45-50 Rc) resurfacing* of worn steel parts for extended useful life. The Mahon method involves special submerged-arc welding, vertical milling and finish grinding. It is as applicable to high-wear new parts as it is to reconditioning older pieces. Why not look into how Mahon 'hard-surfacing' can be profitably used in the products you make or the equipment you use? We suggest you write to Mr. J. W. Ault, Manager of Mahon's Steel-Weld Division.

THE R. C. MAHON COMPANY • DETROIT 34, MICHIGAN

Manufacturing Plants—Detroit and Torrance, Calif.
Sales-Engineering Offices: Detroit, Chicago, New York, San Francisco and Torrance

MAHON

See the DANLY Display at the MACHINE TOOL EXPOSITION, Booth No. 1250

EVEN ONE LESS DAY OF DOWNTIME PER YEAR RETURNS MORE THAN 5% OF YOUR PRESS COST

JANUARY
1
1960

Downtime on an important production press is far more expensive than the direct maintenance costs involved. Schedules are disrupted — workers and machines stand idle—production is lost—profits suffer. Production time on a $30,000 press is very conservatively worth $30 per hour. On this basis alone, one sixteen-hour day of downtime will incur costs of $480. In a nominal 3-year payout period, one extra day of production per year can repay 5% of your press cost.

Danly presses are engineered to give you that extra day of production, *many times over*. Design innovations years ahead of the industry, and an extra measure of brawn and precision keep Danly equipment on the job month after month, without maintenance interruptions.

Outstanding case in point: the 500-ton, straight side press pictured above has been operating at the General Electric Company's Hotpoint Division Plant at Milwaukee, Wisconsin for *eleven full years* without losing a single day of scheduled production! During that time it has paused only twice for planned maintenance. Seven other Danly presses in this pressroom have equally impressive records of maintenance-free operation.

Savings in maintenance downtime alone can wipe out all price differential between quality and "economy" equipment. Still more profit will be realized from longer die life, improved parts accuracy, and other bonus benefits. For a frank and comprehensive review of these advantages, SEND FOR BULLETIN 300.

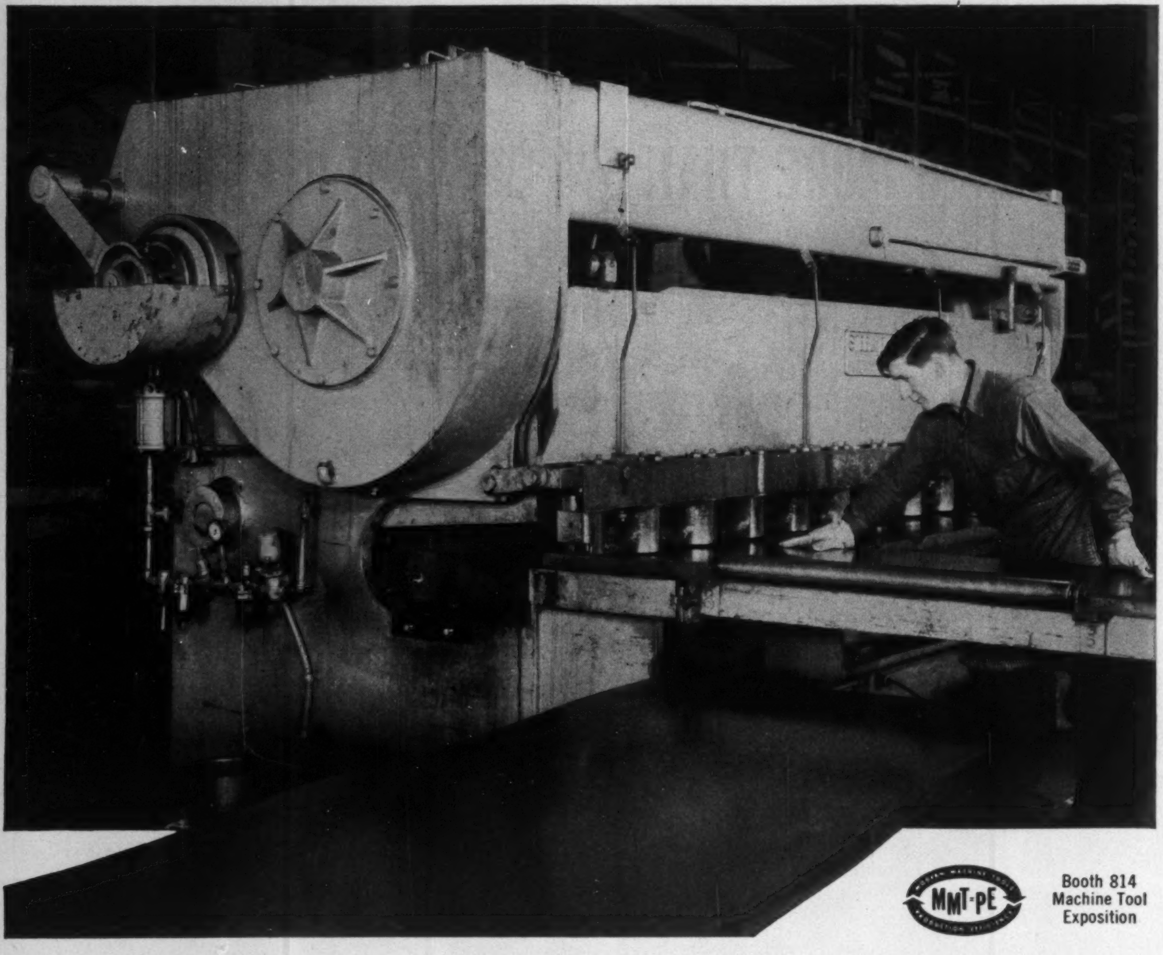
NO LOST PRODUCTION IN 11! YEARS

DANLY

DANLY®

DANLY MACHINE SPECIALTIES, INC., 2100 S. LARAMIE AVE., CHICAGO 50, ILLINOIS

.002 inch clearance between knives produces sharp, straight, accurate edges in the 18 gauge metal cut on this Steelweld Shear. The clearance is easily increased to suit heavier metal. The shear operator is not confined to some average compromise clearance.



MMT-PE

Booth 814
Machine Tool
Exposition

Cuts **1200 PIECES** Per Hour

Farm Equipment Manufacturer Gets Sharp, Accurate Cuts Because of Steelweld's Exclusive Knife Clearance Adjustment

MASSEY-FERGUSON, Ltd., Toronto, well known throughout the world as a leading manufacturer of farm implements does much of the cutting required for the various steel parts with Steelweld Shears.

Massey-Ferguson obtains the best possible cuts because the knife clearance can be adjusted exactly to suit the thickness of metal being cut. It is not necessary to depend upon some compromise difficult-to-change knife setting with Steelweld Shears, as they are easily adjusted to the correct clearance in 10 seconds.

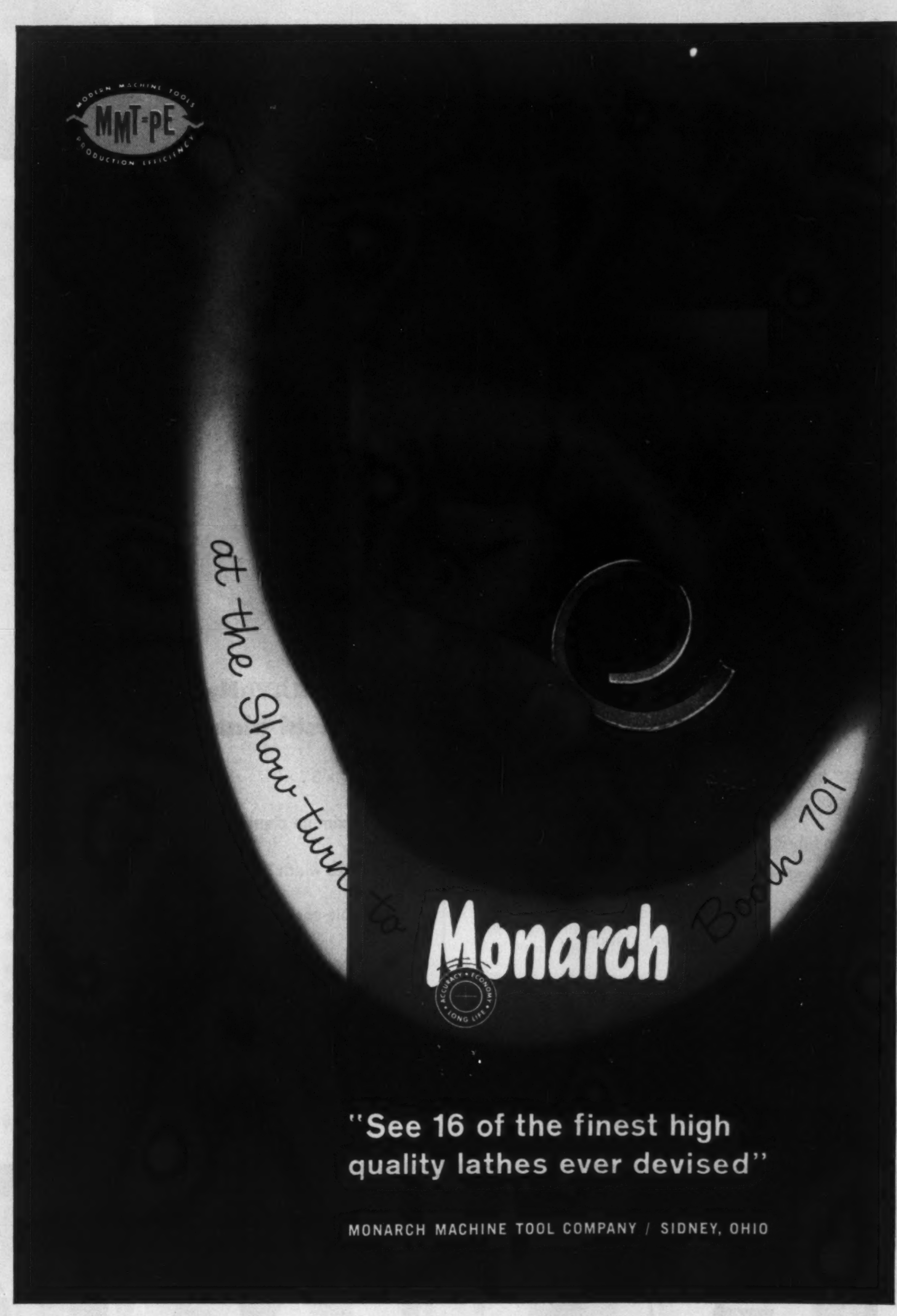
Illustrated is one of the many cutting jobs for which Steelwelds are used. 108-inch lengths of 18 gauge steel are cut into six 18-inch pieces at a rate of 1200 per hour. Knife clearance setting for this work is .002 inch. This shear has been in operation 24 hours a day, six days a week, for many years.

Write for free copy of catalog No. 2011

STEELWELD
PIVOTED BLADE SHEARS

Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4856 E. 282 ST. • WICKLIFFE, OHIO

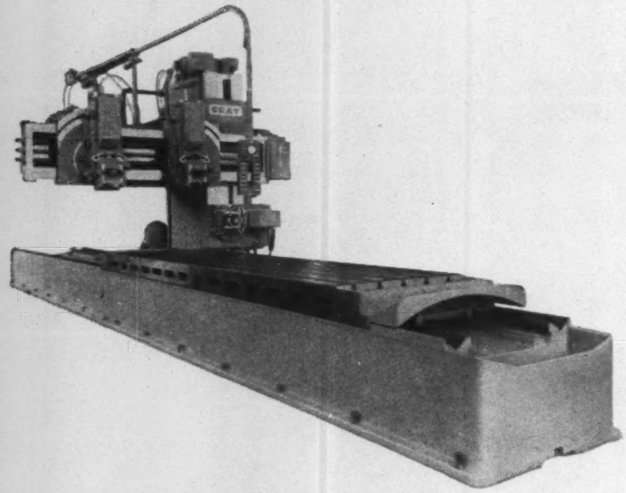

MODERN MACHINE TOOLS
MMT-PE
PRODUCTION EFFICIENCY
at the Show-turn to
Booth 701
ACCURACY · ECONOMY · LONG LIFE

Monarch

"See 16 of the finest high quality lathes ever devised"

MONARCH MACHINE TOOL COMPANY / SIDNEY, OHIO

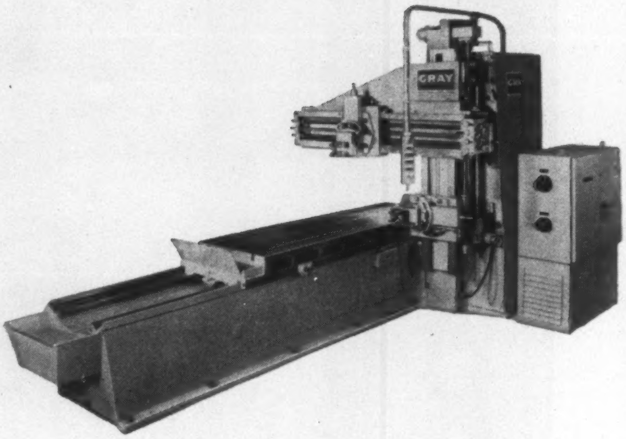
four reasons for



new GRAY double cutting universal planer

- 48″ x 14′.
- Space-saver drive with floating shaft.
- Loop lubrication. Square lock rail and column.
- Improved head design. Simple feed.
- Duplex tables. Air tool lifters.
- Full remote control pendant station.
- Non-metallic table ways.
- 35/75 h.p. variable voltage drive.
- Table speed range 30—300 f.p.m.
- Feed range 64 increments 0—1″.

on display — Booth 1350



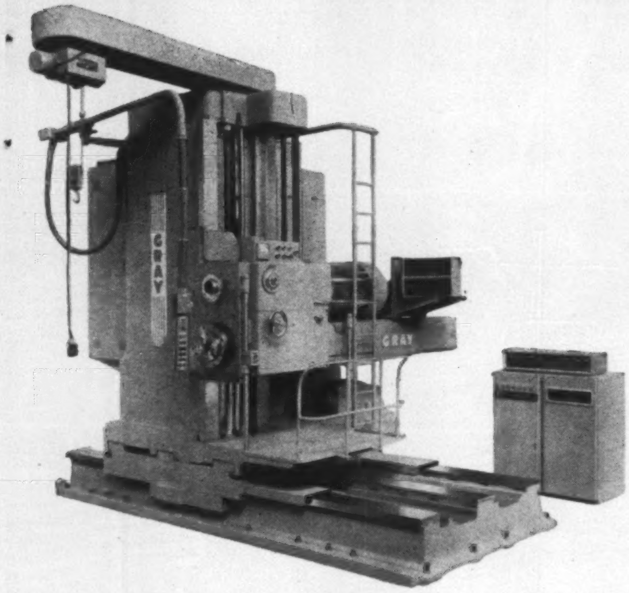
new GRAY flying scot universal planer

- 30″ x 8′.
- Maximum planing height 31″.
- Table width 30″.
- Table speed range 30—300 f.p.m.
- Feed range—infinite 0—½″.
- 60/75 h.p. variable voltage drive 180/1800 r.p.m.
- Maximum planing width 50″.

on display — Booth 1350

new GRAY

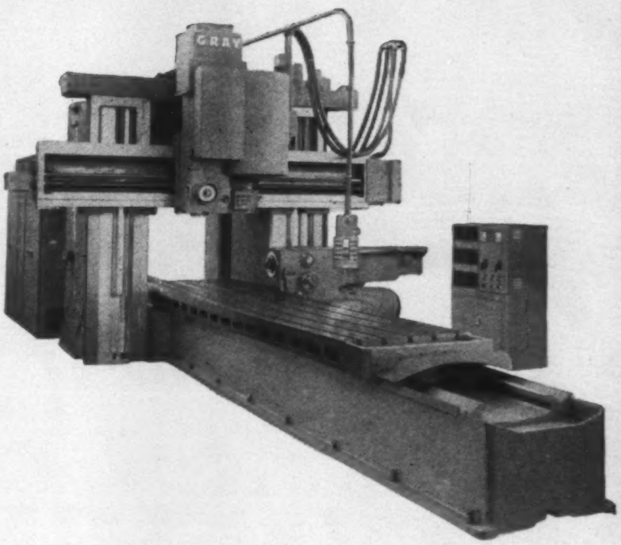
going to Chicago



new GRAY horizontal boring drilling & milling machine

- 6″ dia. nitralloy bar. 60″ bar travel.
- 72″ vertical head travel.
- 96″ column travel on runway.
- 36″ column cross travel.
- 50 h.p. spindle motor.
- 4.5—900 r.p.m. spindle speed range.
- Full remote control pendant station.
- Phase III spacesetter equipment for — horizontal movement of column along runway and vertical movement of head on column—tape reader and reading devices together with related control in floor mounted console.

on display — Booth 1350



new GRAY planer type milling machine

- 48″ x 48″ x 16′.
- 10″ quill, 50 h.p. non-swiveling milling rail head. Width between housings 61″.
- 5″ bar, 30″ travel, 25 h.p. boring side head.
- Maximum width between side head spindle noses 53½″.
- Maximum height between table top and rail head spindle nose 52″.
- 18 spindle speeds—10—500 r.p.m.
- Cable feed range ½″—200″ per minute.
- Head feed range ¼″—100″ per minute.
- Phase I spacesetter, railhead, sidehead and table.

on display — Booth 1350

THE G. A. GRAY CO. • CINCINNATI • OHIO

cost cutters

. . . **Stacks of Nestaway racks** show nesting, interlocking and space-saving features of racks for baked goods handling made by Mid-West Metallic Products for its affiliate, Nestaway, Inc. Rack held by Harold W. Vetter (left), Mid-West director of manufacturing, and Robert J. Adams, purchasing agent, holds 12 loaves of bread and stacks 12 high on castered base. Rack uses up to 13.3 pounds of Pittsburgh Steel Co.'s bright basic wire.

DELIVERING BREAD—BY WIRE

Pittsburgh Steel wire's uniform welding, forming properties give Mid-West Metallic extraordinary success in the manufacture of Nestaway racks

Bread and pastries are delivered better by wire. That is, by welded steel wire racks that perform double duty in handling and selling baked goods.

Mid-West Metallic Products, Inc., a fast-growing subsidiary of Rubbermaid, Inc., uses Pittsburgh Steel Company's bright basic wire to build wire shipping racks for its affiliate, Nestaway, Inc., another Rubbermaid subsidiary. In addition to the Nestaway racks, Mid-West makes more than 300 other wire formed products, using Pittsburgh Steel's bright basic and galvanized wire in a wide range of sizes.

The Nestaway racks, however, are a prime example of Mid-West's experience in using Pittsburgh Steel's .3625 and .3065 bright basic wire.

The racks are part of a complete Nestaway system for baked goods handling to and at the point of sale. The system includes interlocking wire racks, rack shelves and caster bases. It eliminates nearly all direct handling of baked goods between bakery and consumer.

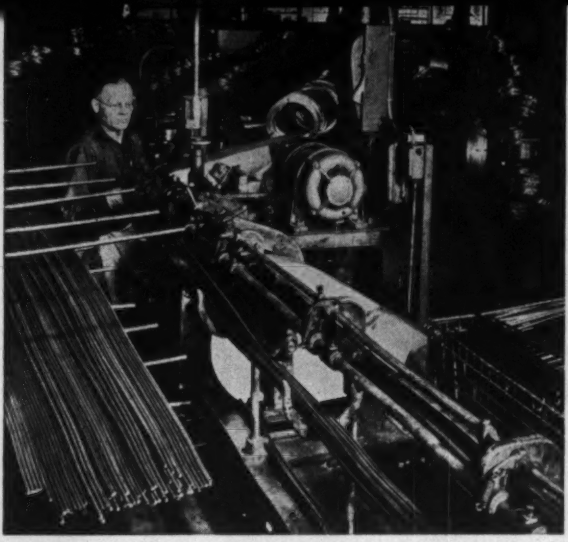
To build the Nestaway racks, Mid-West uses automated and semiautomated forming and welding equipment of its own design. This equipment requires wire with the highest possible uniform physical properties. Mid-West depends on Pittsburgh Steel for much of its wire supply because it is assured consistent, uniform quality.

- **Phenomenal Welding Success**—Made in 11 sizes ranging from 8.4 to 13.3 pounds in weight, an average Nestaway rack requires 200 welds.

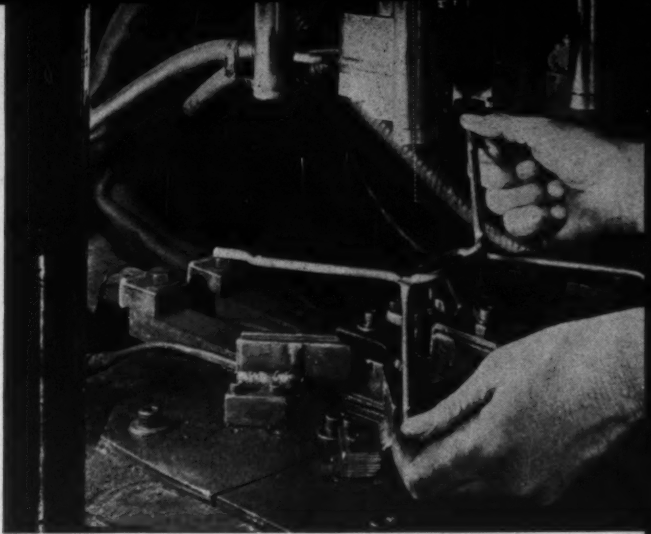
On welding, Harold W. Vetter, Mid-West's director of manufacturing, says:

"In all of our production last year, we had an extraordinarily low number of broken welds. We've had racks returned that had been accidentally crushed by trucks—but the welds were seldom broken."

Purchasing Agent Robert J. Adams adds further evidence of the



. . . From straightening and cutting through final copper-nickel-hard chrome plating, Pittsburgh Steel's wire meets Mid-West Metallic's requirements for consistent uniformity of forming, welding, coating properties.



. . . Key piece of rugged Nestaway rack—the bends and welds on "X"-shaped side supports are produced to tolerances of plus/minus .015 inch by Mid-West Metallic with Pittsburgh Steel's .3625 bright basic wire.

weldability of Pittsburgh Steel's bright basic wire, saying:

"We found Pittsburgh Steel wire would consistently hold welds when we bend the welded ends of the rack's bottom frame to form Nestaway's interlocking feature."

• Close Forming Tolerances—Because Nestaway racks are built to stack when loaded and nest precisely when empty, wire bends are made to unusually close tolerances. Mr. Vetter explains:

"This rack is so accurately formed that it's practically a machined product. Every bend—even over-all dimensions and some welds—is held to a tolerance of .015 inch."

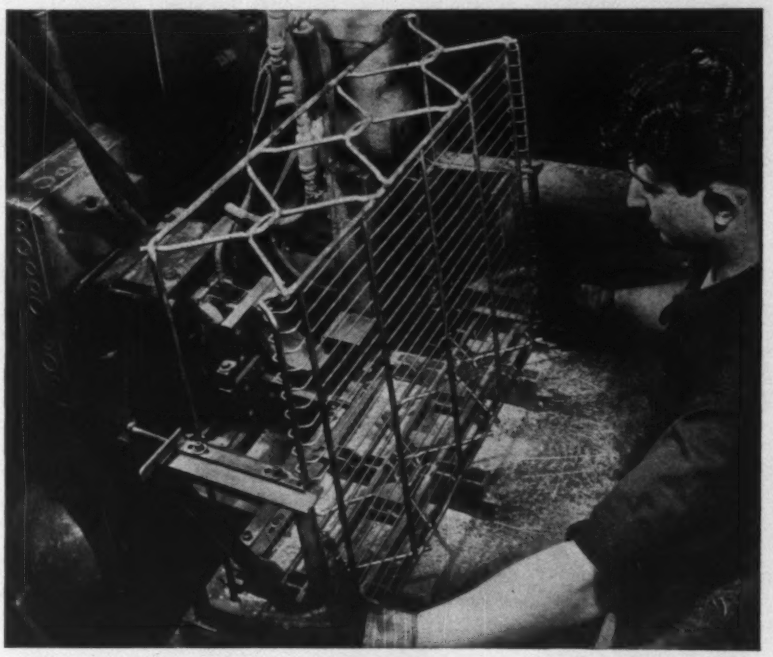
Surface finish of Pittsburgh Steel's wire is vital, too. After assembly, the rack is given a copper-nickel-hard chrome coating to provide a durable, attractive unit which meets strict standards of cleanliness.

Pittsburgh Steel's ability to supply wire with the consistent quality Mid-West Metallic requires is testified to by Purchasing Agent Adams. He says:

"Pittsburgh Steel furnishes us quality wire with uniform properties from shipment to shipment. Otherwise, we're in trouble on our automatic machines. We want wire that is weldable, formable and clean.

"Pittsburgh Steel has been able to give us what we want with consistency and we're extremely satisfied with the way its wire performs for us."

Take a lesson from Mid-West Metallic's experience. The benefits this progressive company gets from using Pittsburgh Steel's wire can be yours, too, whatever your application. Just contact one of the district offices listed at the right.



. . . With 200 welds per rack and a present capacity of more than 25,000 Nestaway racks per month plus component parts of the Nestaway System, Mid-West Metallic experiences very few broken welds in the course of a year. Credit goes to efficient equipment and wire quality. Nestaway rack is shown here in assembly before chrome plating. Mid-West, a subsidiary of Rubbermaid, Inc., looks to Pittsburgh Steel for bright basic wire and plain galvanized wire to make Nestaway racks and more than 300 other products at the new Cleveland, Ohio, plant.

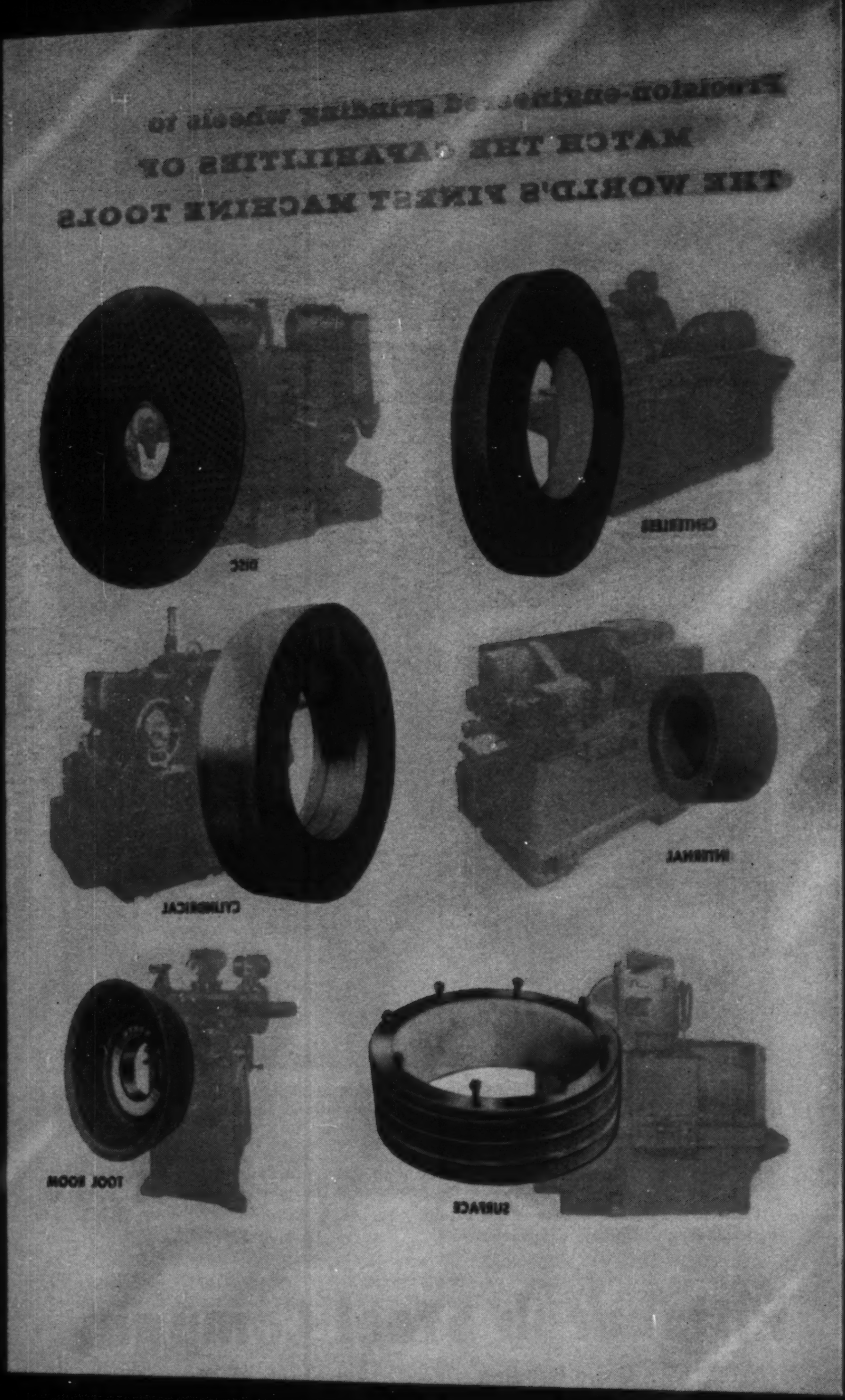
Pittsburgh Steel Company

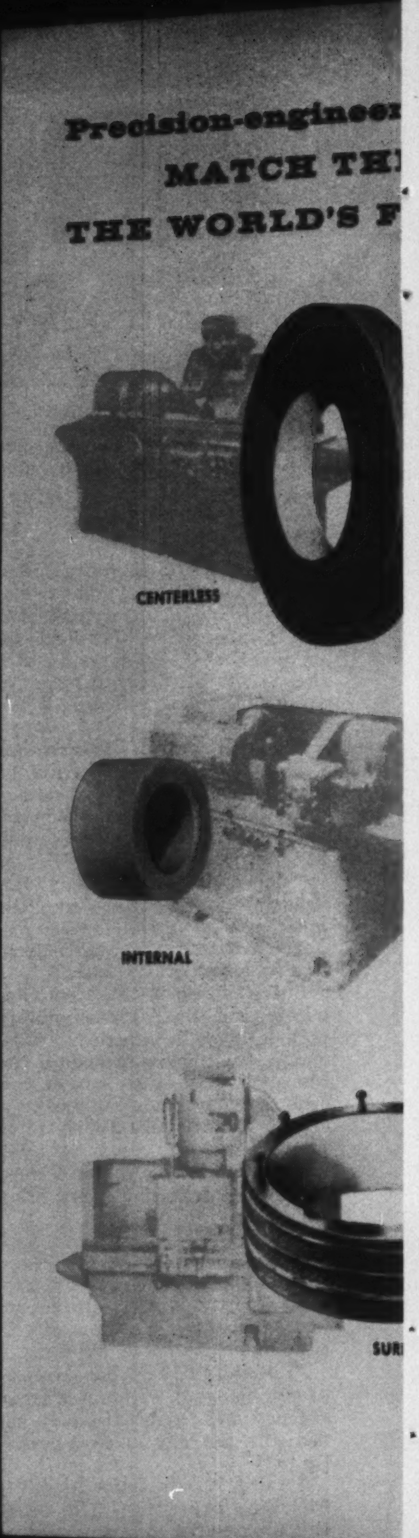
Grant Building • Pittsburgh 30, Pa.

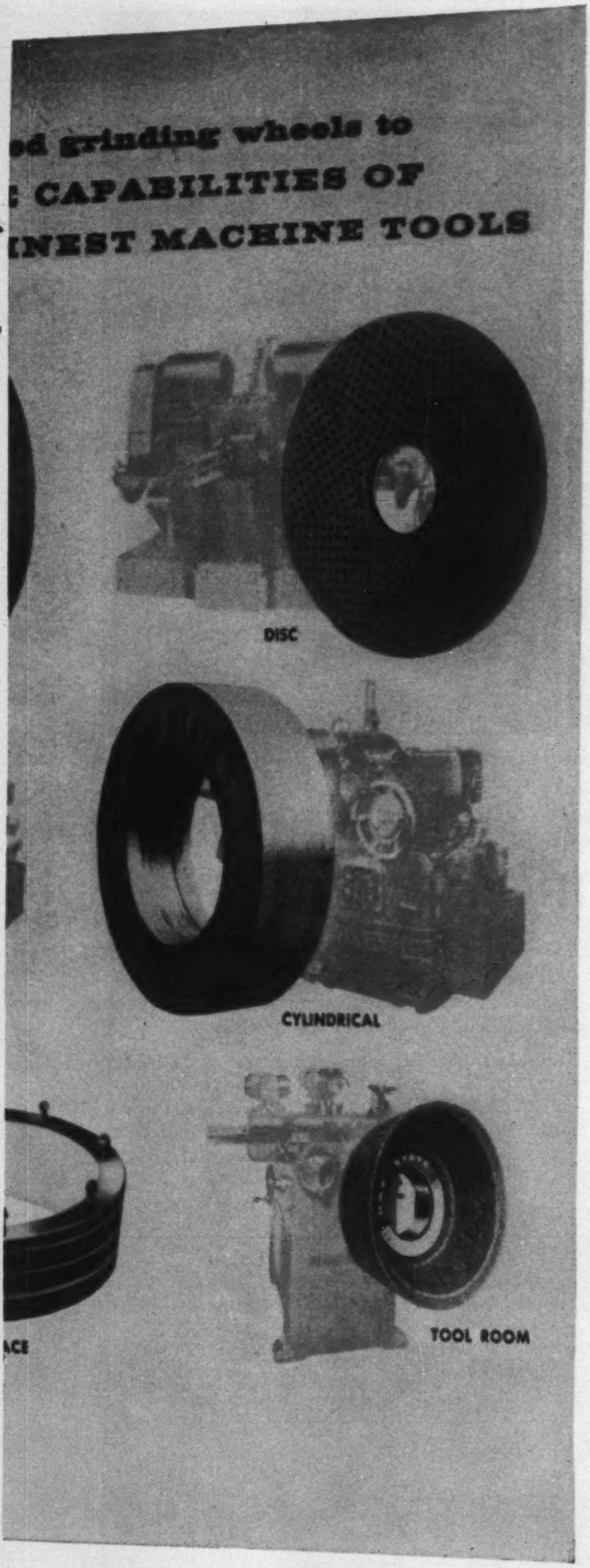
DISTRICT SALES OFFICES

Atlanta
Chicago
Cleveland
Dayton
Detroit
Houston
Los Angeles
New York
Philadelphia
Pittsburgh
Tulsa
Warren, Ohio

Steel




Precision-engineer
MATCH TH
THE WORLD'S F
CENTERLESS
INTERNAL
SUR



BAY STATE
WHEELS of PROGRESS

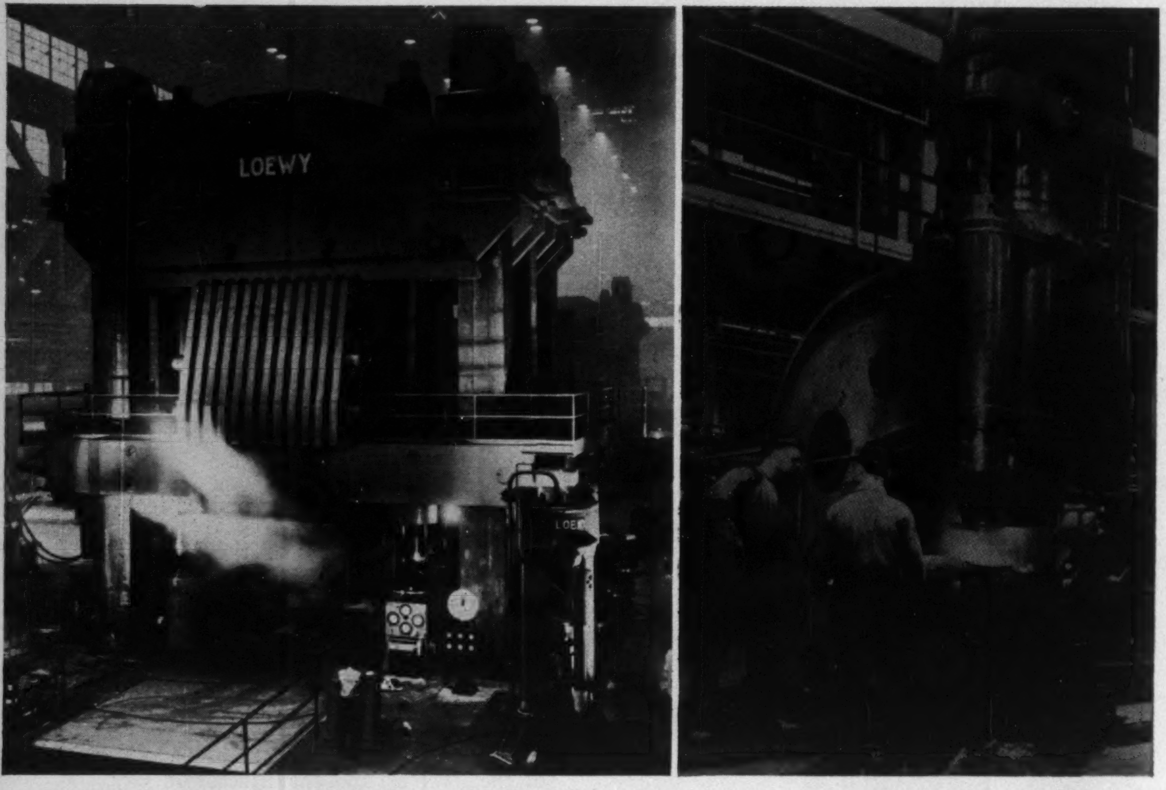
Bay State salutes the tremendous technological achievements of the Machine Tool Industry and joins with the industry in offering to users of machine tools the finest grinding equipment in the world. Working in close association with many of the foremost tool manufacturers Bay State, too, has built an outstanding reputation for technological advancement. Through vigorous and carefully planned programs of product development and research into entirely new materials and techniques, Bay State today is able to offer industry wheels for every known type of grinding operation . . . wheels that assure *"better grinding at lower cost."*

BAY STATE ABRASIVES

Bay State Abrasive Products Co.,
Westboro, Massachusetts
In Canada: Bay State Abrasive
Products Co., (Canada) Ltd.,
Brantford, Ontario.

BAY STATE
WHEELS of PROGRESS

Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.



These two Loewy presses graphically illustrate B-L-H's ability to meet your forging press needs, regardless of press size.

WHAT DO THE CRITICS HAVE TO SAY ABOUT B-L-H LOEWY FORGING PRESSES?

We're talking about the severest, most discriminating critics we know—our customers. With a substantial capital investment involved, they unhesitatingly demand that Loewy presses perform superbly.

Here are just two examples of our customers' judgments. A leading alloy steel manufacturer in Pennsylvania spotlights our 2000-ton forging press in his full-page advertisement in national magazines. The copy states that the Loewy press improves the production of his quality tool steels and that it is ". . . speeding delivery of more-uniform large forgings" in regular production and is ". . . ready to meet special custom forging demands."

Another well-known steelmaker stimulates his sales by means of two brochures which focus on his Loewy press. He testifies that "this fast-acting 2000-ton hydraulic forging press imparts to special steels internal qualities never before achieved."

Similar statements about our equipment are made very frequently. Certainly one of the most remarkable is in a report to the U.S. Air Force which foresees savings of approximately $13,000,000 on a single model of a jet fighter, thanks to the economical production of parts on the famous 50,000-ton Loewy forging press.

B-L-H builds presses for free forging, open die forging, and closed die forging, for hot and cold working of all kinds of metals—ferrous and nonferrous, rare, nuclear and exotic. These machines are available in all capacities from *five hundred to fifty thousand* tons or more. Write Dept. A-8 for further information.

Visit us at Booth No. 504 AISE Show September 27-30 Cleveland Public Auditorium Cleveland, Ohio	Visit us at Booth No. 1226 NMTBA Show September 6-16 Amphitheatre Chicago, Ill.

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division • Philadelphia 42, Pa.

BALDWIN BLH LIMA-HAMILTON

GENERAL ELECTRIC
Offers a Complete Line of

ADJUSTABLE-SPEED DRIVES

☐ *MECHANICAL*
☐ *ELECTRIC*
☐ *ELECTRONIC*

TO MEET EVERY APPLICATION REQUIREMENT

Horsepower
1/4 to 1250

TIMED OR CURRENT LIMIT
Acceleration or Deceleration

OPERATES FROM AC POWER SOURCE

R. P. M.
2 to 6000

SPEED RANGE
Up to 200:1

Constant HP
Constant Torque
Or Both

Remote Preset Speed Control

SPEED REGULATION
10% to 0.1%

SELECT YOUR DRIVES *from General Electric's Complete Line Shown on the Following Pages*

GENERAL ELECTRIC

GENERAL ELECTRIC
Adjustable-Speed Drives Offer

A Great Opportunity

POLYDYNE® DRIVE

Modern, a-c mechanical drive. ¼–25-hp. Speed range to 10:1. New "Equalizer"‡ provides smooth manual or automatic speed control. Produced by Gear Motor & Transmission Components Dept., Paterson, N. J. Write for Bulletin GEA-6806*.

‡ Pat. Pending.

THYMOTROL✝

SPEED VARIATOR

High quality electronic drive. ¾–10-hp. Wide speed range. Small, lightweight. General Purpose and High Performance types. Write for Bulletin GEA-7018 and GEA-7019*.

KINAMATIC®

Speed Variator

Industry's most versatile electric drive. 1–500-hp. Features Kinamatic motor-generator conversion. Speed range up to 200:1. Precise regulation. Regeneration. Wide variety of power unit, motor and control modifications available. Write for Bulletin GEA-6643*.

••••••••••••••••••••••••••

Industry's
most complete line
of modern packaged drives
for every performance level,
every price range

••••••••••••••••••••••••••

General Electric adjustable-speed drives are available for every performance level, every price range to help you boost output, improve quality, increase machine flexibility, reduce installation costs, cut your maintenance budget, add substantial profits to your business.

To make possible these advantages, your General Electric sales engineer is backed by an experienced team of adjustable-speed drive specialists—men who work constantly to help you get more out of your machines.

They offer an unbiased, analytical evaluation of your requirements—recommend the adjustable-speed drive that meets the demands of your application most completely and economically.

GENERAL ELECTRIC

to Modernize for Increased Profits

KINATROL✣
SPEED VARIATOR

Outstanding packaged drive value. Compact, versatile eddy current coupling. 3–100-hp. Stepless speeds 1½:1 to 17:1. 2% speed regulation. For complete information write for Bulletin GEA-6885*.

Parmatic
SPEED VARIATOR

Power amplistat conversion features hermetically sealed silicon rectifiers. 1–200-hp. Speed ranges to 200:1. Lightweight, quiet and vibrationless. Field proven. Write for Bulletin GEA-7012*.

** Write to Section 821-4, General Electric Company, Schenectady 5, New York.*

In Canada, write Canadian General Electric, Peterborough, Ontario.

✣ Trademark of General Electric Company.

RESEARCH

In product research, G.E. invests more than three times the industry average. You benefit from the most modern features in your G-E drive.

ENGINEERING

General Electric industry and application specialists, familiar with your production process, assure proper selection and design of G-E adjustable-speed drives to meet your specific application requirements.

MANUFACTURING

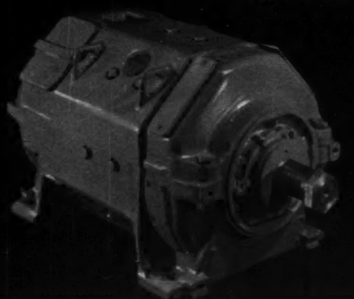
Skilled G-E workers, modern production facilities, standardized components and latest testing methods combine to give you high-quality, adjustable-speed drive equipment, shorter delivery time, lower prices.

SERVICE

G.E.'s service network offers three-way 'round-the-clock' assistance: start-up service, productive maintenance assistance and complete repair service.

MD ARMORED MOTORS

Industry's most preferred d-c mill motor. 500 to 625-hp. Write for Bulletin GEA-4654C*.



KINAMATIC® D-C MOTORS

Most modern, versatile d-c motor for adjustable speed. 1 to 200-hp. Write for Bulletin GEA-6335*.

AMPLIDYNE POWER AMPLIFIERS

Fast response d-c power source with flexible output characteristics. Write for Bulletin GEA-4053B*.

PLUS . . . *industry's most complete line of drive components for both general purpose and special industry application*

To learn more about the modern capabilities of G-E packaged drives and components, call your nearby General Electric sales engineer. ADJUSTABLE SPEED, a new booklet which outlines G.E.'s complete line of modern packaged adjustable-speed drives, is also available to help you modernize for profits. Ask for Bulletin GEA-6999*.

*** *Write to Section 821-4, General Electric Co., Schenectady 5, N. Y. In Canada, write Canadian General Electric, Peterborough, Ontario.***

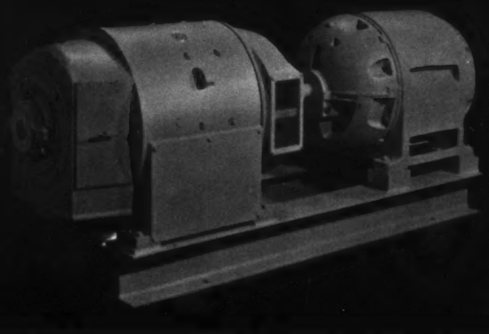
DIRECT CURRENT MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA

HEAVY DUTY M-G SETS

Reliable power conversion for main, auxiliary and process line drives

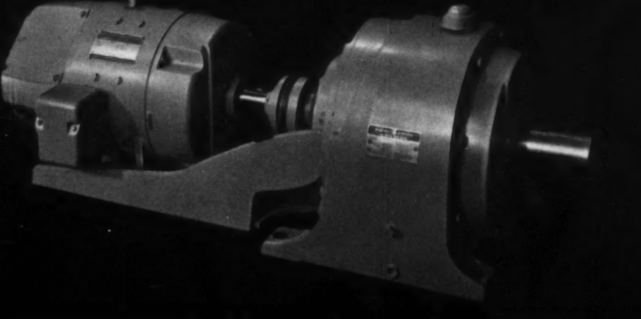


CD-1000 D-C MOTORS

Performance proved. Quality designed. 250 to 1250-hp. Write for Bulletin GEA-5497A*.

ALL-MOTOR GEAR-MOTOR

A-c or d-c. 1 to 75-hp. Simplified maintenance. Produced by Gear Motor & Transmission Components Dept. Write for Bulletin GEA-6704*.

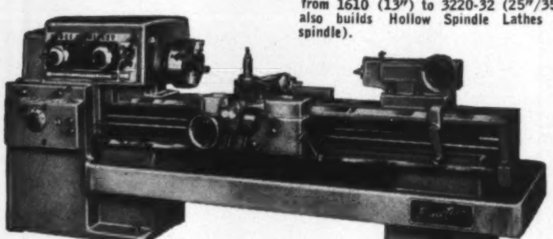


SEE *Lodge & Shipley* COMPLETE LINE
of LATHES • SHEARS • BRAKES • FLOTURN MACHINES
in operation at the Machine Tool Exposition
Booth 1046 • Exposition Hall • Chicago, Ill. • September 6-16

Lodge & Shipley equipment represents almost 100 years of experience in the design and manufacture of heavy metal working machinery . . . offers you the most advanced features for fast, accurate and versatile operation. Lodge & Shipley equipment is precision engineered, ruggedly constructed and honestly rated to give trouble-free, low-cost production.

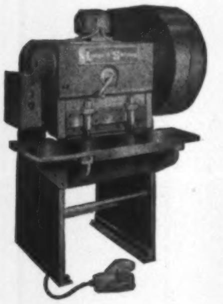
LATHES

Lodge & Shipley **POWERTURN** Lathes combine accuracy and rugged strength with greater precision and operating convenience. Fast, foolproof Speed Dial headstock has just two dials for fast setting of speed changes. **POWERSHIFT PRESELECTOR** Lathes are even faster; single dial for preselection of cutting speeds plus remote shift. Available in Engine, Toolmaker, Gap, 45° and 90° **COPYMATIC** (tracer controlled) Lathes in sizes from 1610 (13") to 3220-32 (25"/35" Raised). Lodge & Shipley also builds Hollow Spindle Lathes (with large hole through spindle).

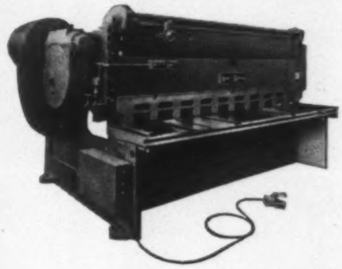


The Lodge & Shipley 1307 HI-TURN (10") Lathe is completely new in size, design, utility and even in its low price. It provides high speed turning, boring and facing capacity where the use of a leadscrew is of no consequence. The HI-TURN Lathe is extremely rugged and has nine geared speeds with a high spindle speed of 3000 rpm and 5 hp, giving the ability to handle newer, tougher metals at production rate. Also available with 45° hydraulic tracer slide and completely automatic cycling.

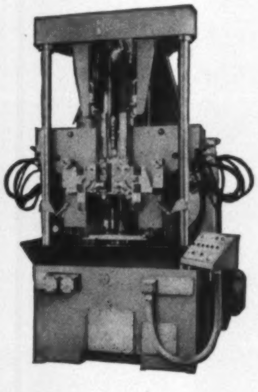
SHEARS



Featuring exclusive combination air clutch and brake which eliminates unnecessary gear wear, gives absolute overload protection, cushions shock. Many other features included in low base price. Capacities from 10 gauge to ⅝" mild steel.

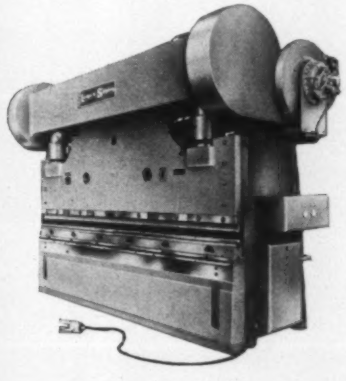


24" SPEED SHEAR . . . designed for accurate duplication of straight side parts without the expense of dies and punch press equipment. Production-proved for straight and angle shearing, slitting, notching, blanking and similar operations at speeds of 120 strokes per minute. Capacity: 10 gauge x 24" mild steel.



BRAKES

Rugged, powerful, heavy duty brakes with many features as standard. Specially-designed combination air clutch and brake installed in heavy, balanced flywheel requires no adjustment . . . known for trouble-free service. Available in capacities from 120 tons to 250 tons.



FLOTURN

Completely new metal forming equipment and process originated by Lodge & Shipley . . . saves time, material and tooling cost. Makes spherical, conical and cylindrical shapes from simple blanks. Replaces many costly forging, drawing and machining operations. No. 12 Vertical Floturn illustrated; larger sizes and sub-contract service also available.

Detailed Literature on Request!

THE *Lodge & Shipley* COMPANY

3073 Colerain Avenue
Cincinnati 25, Ohio

NATCO
A
B
B

From one pushbutton station, the line operates as a single unit, but each machining element has its own controls for independent operation.

A "medium" production transfer line like this can be built by adding as little as 12½ per cent to the cost of the individual machines.

New Convertible Transfer Line Trims Costs of "Medium" Production

By linking four standard Natco multiple-spindle drilling machines with transfer devices, Caterpillar Tractor Co., Peoria, Ill., has substantially reduced the cost of drilling and reaming diesel cylinder blocks. The transfer line incorporates three standard Natco 2-way machines and one vertical C4B.

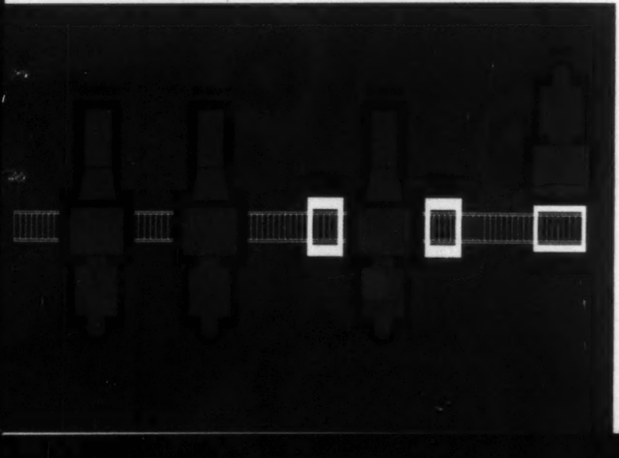
Each machining unit is self-contained with its own hydraulic and electrical system. Machine units can be interchanged or removed from the line for independent operation. Transfer links are standard Natco types.

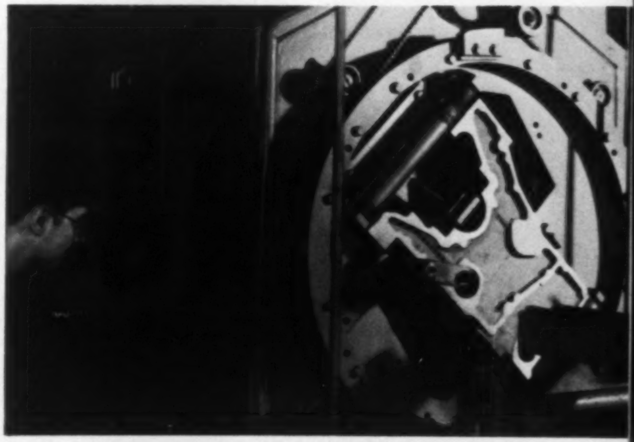
Take advantage of this new approach to "medium" volume production by calling your Natco representative. Write for bulletin No. 100.

NATCO

The National Automatic Tool Company, Inc., Richmond, Indiana

Rollover, shuttlebar, and walking beam transfer devices link the various machining units, of this unusual line.





Rollover device repositions cylinder block. Other Natco transfer devices resolve the loading differences between machining units, providing both in-line and cross-line motion.

NEW PRODUCTS

N/D's new integrally sealed, heavy-duty conveyor ball bearing shuts out moist and dry abrasive contaminants . . . reduces assembly time and eliminates costly relubrication maintenance.

Introduces New Heavy-Duty Cost-Cutting Conveyor Ball Bearing!

Now you can cut conveyor operating and assembly costs substantially with the *new* heavy-duty N/D conveyor roll ball bearing.

This durable N/D precision ball bearing for conveyors incorporates an exclusive integral seal combination—a new, highly efficient Land-Riding Seal and a performance-proved Sentri-Seal. Its minimum torque seal combination shuts out both moist and dry abrasive contaminants . . . and seals in bearing lubricant for life.

This high performance bearing helps cut manufacturing assembly time . . . and helps reduce field assembly costs. These modern design N/D ball bearings require no outmoded separate seal closures, lubricant plumbing, adjusting nuts, springs or collars . . . they're virtually maintenance free!

N/D sealed ball bearings are interchangeable with other type bearings and mount directly on commercially available rolled shafting. Install a few in your conveyor section . . . then compare the reduced maintenance costs to other type bearings requiring constant relubrication. The results will be convincingly in favor of N/D integrally sealed ball bearings . . . year after year!

For additional information call your N/D Sales Engineer, or send today for the new N/D Heavy-Duty Conveyor Ball Bearing Bulletin. Write New Departure Div., General Motors Corp., Bristol, Conn.

Replacement ball bearings are available through United Motors System and its Authorized Bearing Distributors.

DON'T MISS N/D'S EXHIBIT!
BOOTHS 131 & 133
PRODUCTION ENGINEERING SHOW

NEW DEPARTURE
BALL BEARINGS
proved reliability you can build around

DURABLE GOODS NEW ORDERS DROPPED IN JUNE to an adjusted figure of $14.2 billion, down from $14.7 billion in May. This drop was in the face of a slight rise in orders received by nondurable goods manufacturers. Durable goods shipments for June also showed a decline from May--$14.9 billion compared to $15.1 billion.

RETAIL SALES ARE HOLDING STEADY. Dun & Bradstreet's trade review shows sales for the last week in July about equal to previous weeks and little changed from year ago volume. Auto sales are up, but interest in most major appliances is down. Only air coolers, among appliances, advanced from last year's showing.

BRITISH SHOW BRISK DEMAND FOR U. S. GOODS since the lifting of import barriers on many lines in November. The Commerce Dept. reports British traders and consumers have responded favorably. --"in most cases for the first time in 20 years."

CAR OUTPUT IN THE U. S. totaled 4,248,000 in the first seven months of 1960 compared to 3,847,000 in the first seven months of 1959. Truck production this year was 805,000 compared to 768,000 a year earlier.

THE CONSUMER PRICE INDEX FOR DURABLES dropped in June to 111.5 (1947-49=100), from 111.9 in May. The overall index rose slightly. The durable goods price index for June 1959 was 112.8.

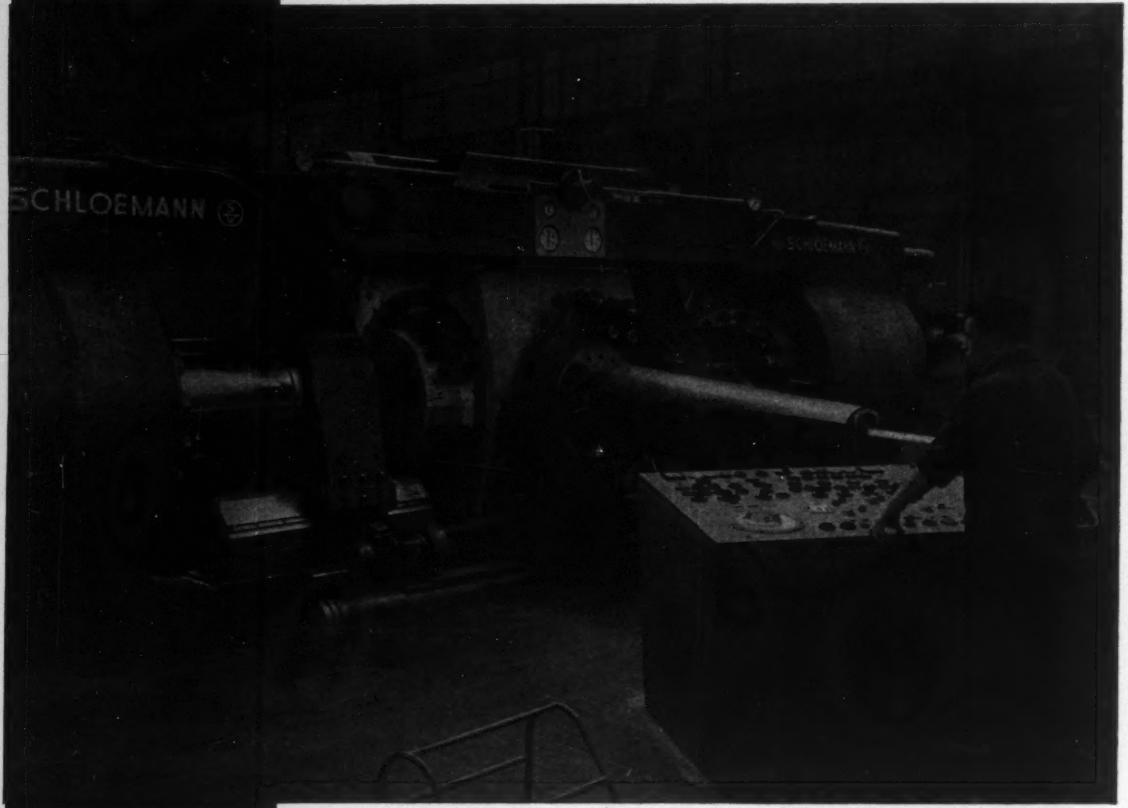
BOOMING SALES ARE FORESEEN IN LIGHT PLANE INDUSTRY. A top industry official predicts 1960 sales of $200 million, up from $173 million in 1959. Other estimates: $400 million by 1965, double again by 1970. This official predicts the 30,000 business planes now in use will double in next decade.

INDUSTRIAL FASTENERS SHOW UPSWING. The Industrial Fasteners Institute index of shipments for June rose to an adjusted 94 (1956-58=100), up from 92 in May. This is the first upswing in the index since February of this year.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a 9.3 pct increase in June over May. The June index was 269.8 (1947-49=100) for new bookings. This is above the 1959 average of 234.7. The index of shipments rose in June to 253.6, up from 241.3 in May.

SCHLOEMANN

21 Aluminum Cable Sheathing Presses in three Years



Operational sequence of the SCHLOEMANN aluminum cable sheathing press is now fully automatic, in continuous cycles. Sheathing thickness is held to specification even though extrusion may be interrupted. This press is an outstanding example of many successful innovations accomplished by SCHLOEMANN in connection with the plastic deformation of steel and non-ferrous metals. *Write today for descriptive literature.*

FELLER ENGINEERING COMPANY 1190 Empire Building, Pittsburgh 22, Pa.

HOT AND COLD ROLLING MILLS • COUNTERBLOW HAMMERS • HYDRAULIC PRESSES

Industry Can Make Greater Use Of Commerce Field Services

The nationwide network of Dept. of Commerce field offices will handle about a million requests for aid this year.

But, even so, field office officials say business doesn't take full advantage of its services. —By P. J. Cathey.

BUSINESS CONFERENCE: Carl W. Messinger, director, Iron & Steel Div., Business and Defense Services Administration, (left), and William A. White, Sr., BDSA Administrator, (center), confer with Richard H. Krause, director, Office of Field Services, U. S. Department of Commerce.

▪ This year the 33 field service offices of the Dept. of Commerce will handle over a million requests from business for aid.

But, despite this, field service officials believe they can do a great deal more for industry—if asked.

"Business is not taking full advantage of the field services of the Dept. of Commerce," says Richard H. Krause, its Washington director. "With our nationwide system of field and cooperative offices there's rarely any need for a businessman to call Washington for help. If the information he wants isn't available locally, the field office can get it quickly from Washington."

Geared to Serve — Mr. Krause points out Congress stepped up Dept. of Commerce funds so that more field personnel could be employed. "This is part of a vigorous campaign to inform the American businessman of the services and resources of the U. S. Dept. of Commerce," he adds.

In the Philadelphia field office, its manager, David Jamieson, agrees field service help is frequently ignored by business.

"The large companies, those with their own marketing or foreign trade experts, are generally aware of our services—and use them," says Mr. Jamieson.

"But the smaller companies, those without the time or talent to find the answers, don't take advantage of our facilities. Our personnel have the training and experience to help —if they're asked."

User's View—How does a businessman who uses the field office feel about its services?

An enthusiastic answer comes from Stuart F. Louchheim, chairman of the board, Nuclear Electronics Corp., Phila. "As far as we're concerned the big advantage of the field office is its nearness and efficiency. By picking up the telephone we get the data we want quickly. And what's provided is complete. It may answer questions which you don't even think about until later.

"By not consulting the local field office of Commerce, some businesses are spending money when it isn't necessary. A lot of the information they're looking for is as near as their telephone."

Two Advantages—Help from the Dept. of Commerce field offices has two important advantages: It's free, except for the nominal amounts charged for government publications; and it's confidential.

All contacts with businessmen are kept on a strictly confidential basis. Sometimes, according to field office personnel, a businessman finds the answer to a problem by just "talking it out" with an experienced listener.

But when detailed data is needed,

How Commerce Can Help You In—

Planning or Marketing a New Product. Offer advice on uses for the product. Pinpoint its probable markets by statistical analysis of census data. Indicate ways of introducing it. Provide distribution data.

Selling Overseas. Furnish lists of foreign buyers and suppliers. Provide trade, investment, and licensing information. Supply data on any import quotas, tariffs, and regulations. Outline any exchange control regulations.

Business Travels. Arrange interviews with U. S. foreign trade experts for businessmen going overseas. These trade "desks" in Washington can brief travelers on the countries involved, provide lists of prospective business contacts, and help in planning meetings with foreign businessmen.

Locating a New Plant. The Office of Area Development serves as a clearing house for government data on industrial location. Among material available: Population, business, and manufacturing trends; tax rates, power sources and cost, wage-and-hour data, state and local finances, and industrial location patterns.

Government Buying and Selling. Field offices can supply information on which agencies buy what items, where they buy them, and where to get specifications for bidding. Commerce Dept.'s daily Synopsis (cost is $10 a year) gives complete list of all U. S. procurement, sales, and contract awards of over $10,000.

Finding Technical Information. The Office of Technical Services has technical reports of new products, processes, and advances made through Government-sponsored research. OTS can supply information on technical problems faced by the Armed Services.

the field offices are ready to supply it. The Dept. of Commerce set up the field offices as the clearing house for information from the Business and Defense Services Administration and its units—the Office of Distribution, the Office of Technical Services, and the Office of Area Development.

What's Available—In addition, the field offices offer industry ready access to the services, publications, and reports of the Office of Business Economics, the Bureau of Foreign Commerce, and the Bureau of the Census.

And as sales agents for the Government printing office, the field services can quickly obtain any priced government publication.

All these services can help in a wide variety of business problems. (See box). Field office officials point out they are not competing with market analysts and foreign trade consultants. These private specialists are among those making the greatest use of Dept. of Commerce statistics. However, field office personnel can quickly locate all the data from which a complete market study can be made.

Census Data Valuable — One very valuable marketing and economic aid readily available at all Commerce offices is census data. And field office staffs can show businessmen how to put this information to effective and profitable use.

Census data available includes the latest reports on business (retail, wholesale, and services), the mineral industries, foreign trade, manufactures, agriculture, finances, and employment. Preliminary reports on the 1960 census of population and housing are now coming out.

Typical of operations in the 33 field offices are activities at the Philadelphia office. Seven specialists in domestic and foreign trade, plus an office staff of seven, work under the direction of manager David Jamieson.

Right now, one of the office's foreign business analysts, Patrick P. McCabe, is on his way to Turkey. It's part of a two-month stay in Europe which will improve his already extensive trade knowledge. Until Sept. 20 he'll be at the International Fair in Izmir, Turkey, in attendance at the U. S. exhibit.

While there he'll meet with Turkish businessmen—discussing both their imports from and exports to the U. S. Before returning home, he plans to visit U. S. embassies in Milan, Rome, Frankford, Bonn, Paris, and London. At each stop the purpose is the same: A thorough study of American trade relations.

Meanwhile another Philadelphia staff member, domestic business analyst Edward F. Doidge, is serving the needs of U. S. business in the four-state area his office covers. He, and others in the office, are ready to answer questions on census data, economic indicators, industrial and area development, distribution, and marketing.

Mr. Doidge's duties include out-of-the office calls on industry to explain the services Commerce offers. He also collects information for the various industry reports issued by the Business and Defense Services Administration.

The work of the field offices is aided by the hundreds of cooperative offices — branches set up through local chambers of commerce and other business organizations.

Utah Is New Source of Beryl Ore

Beryllium Industry Currently Imports Its Ore Needs

Large deposits of beryl ore in Utah promise to give beryllium producers their first domestic source of ore.

But a concentration process is needed to upgrade the low-grade ore.—By T. M. Rohan.

▪ The fast-growing U. S. beryllium industry, which imports all of its ore from South America and Africa, is turning its attention to sources closer to home.

Brush Beryllium Co., Cleveland, is working with Beryllium Resources, Inc., a Los Angeles mining company, to determine the best method of using low-grade beryl ore deposits in Utah. Beryllium Corp., Reading, Pa., and other companies are also interested in the Utah ore.

Low Metal Content—Metal content of the ore is only about 1 to 2 pct, about the same as foreign ore in its native state. But overseas ore is raised to 11 pct beryllium oxide content or better with hand cobbing by low cost native labor. Foreign deposits are also generally scattered in small pockets.

The Utah deposits are continuous; a central concentrator to raise the beryllium content is a feasible substitute for the cheap hand labor. Beryllium Resources and Vitro Corp. of New York have interests in a large beryl ore deposit in Utah's Juab county.

Announcement of the deposit and plans to use it was made recently at Salt Lake City by Bruce W. Odlum, president of Beryllium Resources, and Bengt R. F. Kjellgren, Brush chairman. Beryllium Resources is a part of the Atlas Corp. and has Dr. Norman C. Williams as vice president in Salt Lake City. He is also a consultant to Brush.

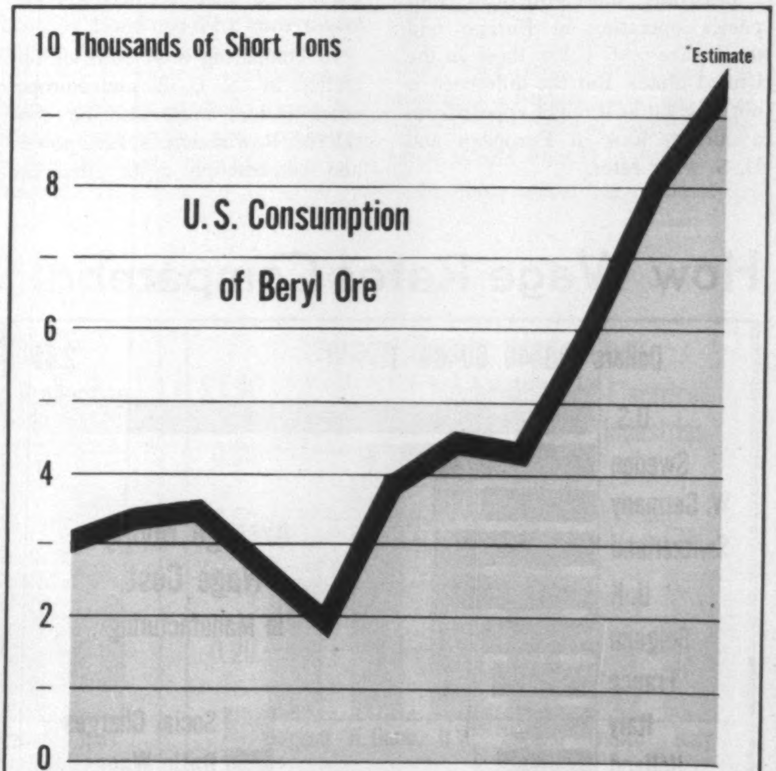
Competitive Source?—"While there is a good supply of foreign ore, the Dept. of Defense is interested in having a domestic source," says Mr. Kjellgren. "We feel we can use the ore from Utah at competitive prices. In foreign countries beryl ore is hand-picked from widely scattered pockets and brought by burro and other primitive methods to gathering points.

"With U. S. manpower, we can't compete on that basis. But we can make up for the lower beryl content with a central concentrating plant to upgrade the ore. We are now working out the most economically feasible concentration system to use with our existing reduction and fabrication facilities. There are several possible ways of doing it and when we work out the right one, a concentrating plant will probably be put up," he says.

Growing Fast—Sales by the U. S. beryllium industry have shot ahead in recent years because the metal fills specialized uses in atomic energy and aerospace projects.

Although in the jewelry class at $75 to $125 for simple machined shapes, beryllium is being used increasingly in atomic energy work because of its low neutron absorption; aircraft and space vehicles for its high strength-to-weight ratio and heat sink properties; and instrumentation for its light weight.

Demand for Beryllium Grows



Wages and Taxes in W. Europe

By **J. J. Thackara,** Vice President, The Chase Manhattan Bank, Paris

Wage costs are generally lower in W. Europe than in the U. S. But the differences are not as great as those at first glance.

Taxes, too, are lower. But direct comparisons are even harder to make.

▪ One result of the rapid growth of business activity in Western Europe has been that American corporate executives are intensifying their study of the European business scene especially as to possible additional investments in Europe.

Judging from my conversations with Americans reconnoitering in Europe, two subjects of special interest are labor costs and taxes.

Generally, most American companies operating in Europe find their wage costs below those in the United States. But the difference is not so great as it might appear from a cursory look at European and U. S. wage rates.

Hard to Compare — There are technical difficulties in measuring comparative hourly wage rates and the data available can often be misleading. If hourly wages could be related to productivity, or actual output per man hour, the difference between U. S. and European labor costs would not appear so great. American workers often have more timesaving capital equipment at their disposal, and therefore greater output per hour.

The table below shows the estimated average hourly wage costs, including social charges, in the manufacturing industries of Western Europe. Compared to the American average of $2.68 per hour, they are still far below levels in this country. Sweden is the highest with $1.08 and The Netherlands the lowest with $.57 per hour.

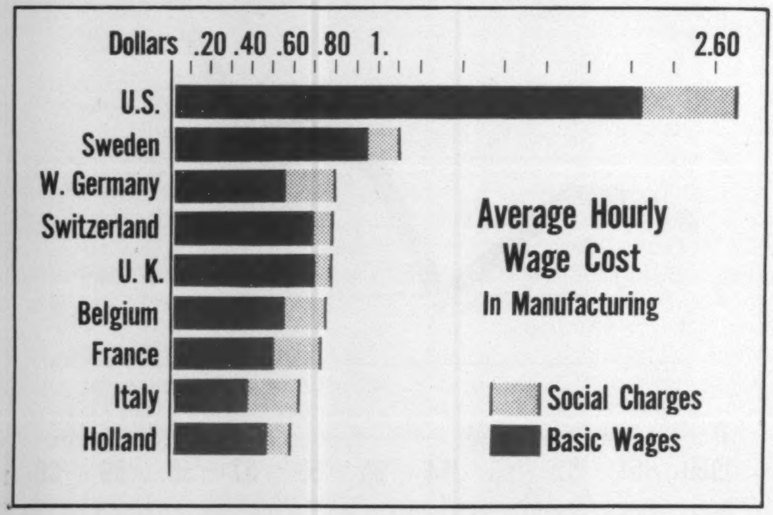
In comparing total costs of operation in the U. S. and Europe, other factors must also be considered. Raw materials, fuel, power, and construction costs often are higher in Europe and may counterbalance lower labor costs.

Next Week Getting Started In Western Europe

There are several ways American companies can get into business in W. Europe. Choosing the right one can mean the difference between success and failure.

Next week's article will outline the pros and cons of various methods.

How Wage Rates Compare



Costs Vary—The table indicates that social charges make up a larger part of total labor cost in Europe than in the United States. These include paid vacations, pensions, unemployment insurance, and in some countries, benefits such as a family allowance based on the number of a worker's children.

It must be remembered, too, that European wages costs vary from country to country, industry to industry and region to region.

For example, French labor costs for all manufacturing industries are at about the midpoint among Western European countries. In the French metal producing industries, however, they are among the lowest.

Rising Wages — British labor costs average lower than German but run higher in the mechanical and electrical industries. On a regional basis, the going rate for labor in southern Italy is about 40 pct below that in the north.

For certain types of skilled labor (in short supply throughout Western Europe), the wage differences between countries are very much smaller.

Although European wages are

considerably lower than those in the U. S., European wages have been rising somewhat faster. Between 1950 and 1958, wages in the Common Market countries (France, West Germany, Italy, Belgium, the Netherlands and Luxembourg) rose at an average rate of about 8 pct a year, compared with 5 pct in the U. S. When these figures are adjusted to allow for inflation, the spread is smaller—about 4 pct in the Common Market and 3 pct in the U. S.

Differences — These overall figures hide important differences. Germany and France had much higher real wage increases than Italy and the Netherlands. Outside the Common Market other differences arise. The real wage increase in Sweden, for example, was estimated at 5½ pct a year while in Britain it came to 1.3 pct.

In the long run, further development of the Common Market will tend to level out wage differentials among the Inner Six countries. The key question is whether the trend toward faster wage increases in Europe will continue. The answer, to a large extent, depends on the European labor unions.

Unions Grow Stronger—Labor unions in Europe are not organized to bargain for higher wages as effectively as they are here. Traditionally, European unions are more oriented toward political activity rather than to collective bargaining. Their legal status is not as strong, and low income levels have tended to limit their treasuries.

ON THE SCENE: As manager of Chase Manhattan's Paris branch, James J. Thackara presents his close-up view of wages and taxes in W. Europe.

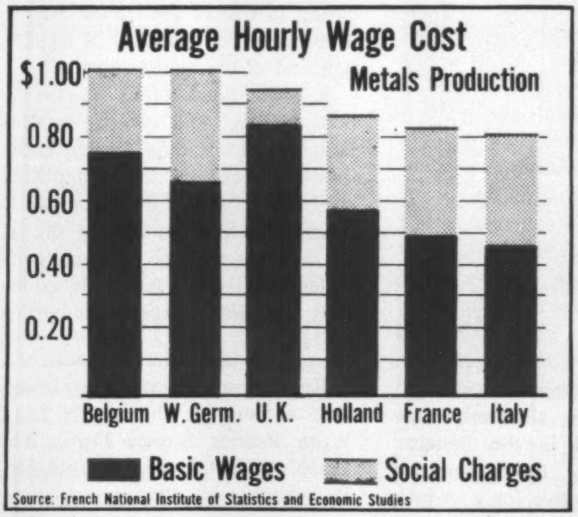
But along with the post war boom in Europe, union leaders are putting more emphasis on collective bargaining. They are tightening union organization, building up financial resources and pressing harder for more pay and shorter hours.

This pressure is building up at a time when unemployment is low and times are good. And this makes it more difficult for European government and business to resist further union demands.

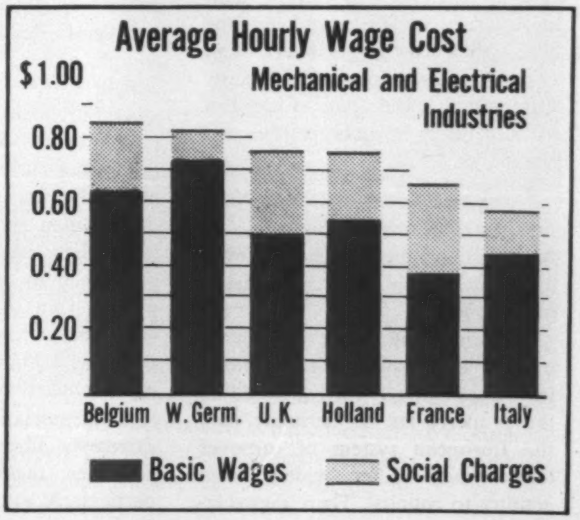
Productivity Gains — Despite growing pressure, European manufacturers may still be able to keep wage increases in line with productivity. Large capital investment and technical advances have increased output per worker substantially since World War II.

In many industries, productivity

Wages Differ by Industry, Country



Source: French National Institute of Statistics and Economic Studies



Business Taxes in the Common Market

	MAXIMUM TAX RATES FOR EUROPEAN CORPORATIONS	WITHHOLDING TAX ON DIVIDENDS*	TAX CONCESSIONS AVAILABLE TO EUROPEAN CORPORATIONS
BELGIUM	The maximum rate on retained earnings is 40 pct on amounts over $200,000. Distributed earnings are subject to two taxes: a 20 pct National Crisis Tax and a 30 pct Invested Capital Tax.	None	Belgium's tax incentives include extremely liberal depreciation allowances and the deductibility of the retained profits tax as a business expense.
FRANCE	Corporations now pay a tax of 50 pct on earnings, wether distributed or not. Before the 1958 reforms, the tax was 45.6 pct, plus a 20 pct tax on excess profits and other special taxes.	15 Pct	French income tax law makes a special provision for increased costs of replacing inventory and plant because of inflation or devaluation.
GERMANY	Retained earnings are taxed at a 51 pct rate. In 1958, the tax on distributed earnings was cut from 30 pct to 15 pct.	15 Pct	In view of the low tax on distributed earnings, the withholding tax on dividends to U. S. shareholders may be raised from 15 pct to 25 pct.
HOLLAND	The maximum tax rate is 47 pct on earnings over $13,150 — whether distributed or not.	None	In addition to normal write-offs, Holland offers both special investment deductions and accelerated depreciation up to 33½ pct on new buildings and equipment.
ITALY	Earnings are taxed at a rate of about 26 pct (including local charges), plus a 15 pct tax on excess profits (i.e. profits over 6 pct of capital and reserves), plus a .75 pct tax on capital and reserves.	None	Exemption from taxes — for up to 10 years — is available for companies which locate in the underdeveloped South of Italy.
LUXEMBOURG	The maximum rate is 40 pct on amounts over $20,000 — whether distributed or not.	15 Pct	The Grand Duchy authorities are willing to allow substantial tax concessions to U. S. companies which invest in Luxembourg.
SWITZERLAND	About 38 pct, of which only 8 pct is federal. Cantonal taxes vary.	5-15 Pct	Holding companies pay no income tax in some cantons.
UNITED KINGDOM	A 51.25 pct on net profits—whether distributed or not.	None	Depreciation allowances are increased by 10-20 pct for new investments.

Source: Chase Manhattan Bank. * For non-resident U. S. shareholders.

gains have been large enough to support rising wages and still give European manufacturers an edge in international trade.

At the same time, monetary controls have been adopted to combat inflation. Vigorous attempts are being made to maintain stable prices and keep European producers competitive in world markets.

Although wages may continue to gain more rapidly in Europe than in America, it will be a long time before they reach U. S. levels. And it may be even longer before any wage-price spiral puts European manufacturers at a competitive disadvantage.

Compare Taxes — Direct comparisons between European and American business taxes are even harder to make than comparisons of wage levels.

For one thing, there are a great number of uniquely national taxes in Europe: The French patent tax, the property tax in Germany, and the European system of turnover taxes which differ widely from country to country. Then, depreciation allowances are computed differently, and tax reductions to encourage investment take many forms.

All the Common Market countries offer tax concessions of one kind or another. These vary according to the government's desire to attract new industry—ranging up to the ten-year tax exemption offered by Italy to investors in the underdeveloped southern regions.

Liberal Treatment — A further complication is the fact that tax administration is far more liberal in most European countries than it is in the United States, and negotiation of tax settlements is more common. Thus the actual effective rate of taxation is frequently much lower than the nominal rate.

Subject to these limitations, a general idea of the tax picture in Western Europe can be gained from the table above. The following conclusions may be drawn:

1. Depreciation allowances are extremely liberal in the Benelux countries, making these countries particularly attractive for a growth company planning to finance expansion out of retained earnings.

2. Germany's 15 pct tax on distributed profits is by far the lowest in the Common Market, and favors companies which pay high dividends.

3. France and Italy offer substantial tax concessions for companies operating in depressed or underdeveloped areas.

4. The British tax system is closest to that of the United States, in terms of the character of legislation and of the administration.

5. Switzerland offers important tax advantages for companies who wish to reinvest their foreign earnings overseas. Holding companies established in certain Cantons of Switzerland pay no income tax at all, and tax treaties between Switzerland and other European countries sometimes favor Swiss corporations.

Reprints of this article are available as long as the supply lasts. Write Reader Service Dept., The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

New Diesel Markets Opening

American Marc Expects $400 Million in Sales

Under the leadership of W. Denis Kendall, American Marc, Inc., has opened the diesel engine field.

Mr. Kendall sees a U. S. market of $400 million and additional international markets.—By F. J. Starin.

■ A small, but thoroughly modern plant in Inglewood, Calif., is quietly revolutionizing the diesel engine industry.

American Marc, Inc., has perhaps set forth the biggest expansion program in the industry. It is currently turning out about 40 nine hp diesel engines a day. During this quarter, plans call for daily output to reach 60. By the end of the year, it will be close to the capacity of 120 daily.

These are diesel engines weighing 100 lb and being built as marine outboard motors. The man behind this trend to smallness in diesels is British-born W. Denis Kendall.

International Business—Mr. Kendall is figuring on capturing about 5 pct of the outboard motor market. His associates say he is conservative. There are more than 5.5 million outboard motor owners in the U. S. and the potential growth has been estimated in the millions.

In addition, American Marc has an international division that will license manufacturers in other countries. Where there is no appropriate manufacturer, the diesel engines will be exported.

Mr. Kendall figures the U. S. market for diesel engines now stands at $100 million to $150 million annually. In five years, this figure is expected to reach nearly $400 million.

American Marc uses aluminum extensively to cut the weight of the engines. But the diesel outboard motor still weighs more and costs more than comparable gasoline engines. The economy is in operating savings. For example, diesel fuel is cheaper and there are fewer moving parts.

A Safer Motor—Mr. Kendall also claims that the diesel outboard motor is safer. He cites lower insurance rates for diesel-driven boats as examples.

Next year, American Marc plans to come out with a 15 hp outboard that will weigh about 115 lb. Eventually, it expects to produce a 30 hp unit weighing 140 lb. Work is also underway on inboard diesel engines.

On land, Mr. Kendall's eye is on the refrigeration and farm tractor markets. In fact, two tractors with American Marc diesels are now undergoing tests. There is also a possibility that American Marc diesels may find a market in taxicabs. The company claims they are lighter and develop more torque than British and German diesels now being tested.

On Natural Gas—On top of all this, American Marc has developed a 12 hp diesel that runs on natural gasoline. Excellent possibilities are viewed for the powering of oil well pumps. The fuel supply would be the natural gas that is found with the oil.

The military gave American Marc its biggest boost. The Defense Dept. bought 7½ and 16 hp diesels for standby power units and for installation in lifeboats. The U. S. Marines use the company's 4½ hp diesel engine and generator set for radio and radar units.

Mr. Kendall would welcome competition, particularly bigger companies, "who could help us develop the market."

COSTLIER, BUT MORE ECONOMICAL: Diesel outboard motors are assembled in the Inglewood, Calif. plant of American Marc, Inc. The motors are heavier and cost more than gasoline outboards, but are cheaper and safer in the long run, the company says.

EDMUND F. MARTIN

ARTHUR B. HOMER

Bethlehem Elevates Homer and Martin

▪ Arthur B. Homer has been elected chairman of the Bethlehem Steel Corp. and the Bethlehem Steel Co., its principal subsidiary. Formerly Bethlehem's president, he will continue to serve as the chief executive officer.

Edmund F. Martin, the company's vice president in charge of steel operations, has been elected president. Both Mr. Homer and Mr. Martin have been with Bethlehem since the beginning of their careers.

Mr. Homer had served as Bethlehem's president since 1945. He has handled the additional duties of chief executive officer for the past three years. The company's steelmaking capacity has nearly doubled under Mr. Homer. It has a present annual rating of 23 million ingot tons.

VP of Shipbuilding—During the war years, Mr. Homer was vice president in charge of the Shipbuilding Division. Between 1940 and 1945, Bethlehem built more than 1100 merchant and naval vessels. As a result of this program, Mr. Homer was cited numerous times. He received the Presidential Certificate of Merit for Outstanding Service and the Jerry Land Medal of the Society of Naval Architects and Marine Engineers.

Mr. Martin is a member of the American Iron and Steel Institute and the Assn. of Iron and Steel Engineers. He was formerly vice president of the Associated Industries of New York State.

He joined Bethlehem Steel in 1922. He was a member of the first class in Bethlehem's management training course for college graduates. He progressed from shop foreman to vice president in 27 years.

Mr. Martin received his mechanical engineering degree from the Stevens Institute of Technology. At Stevens he was elected to Tau Beta Pi, honorary engineering fraternity.

Pittsburgh Steel, USW Agree to New Pact

A plan for adjusting incentive rates has been agreed to by Pittsburgh Steel Co. and United Steelworkers of America.

The new plan calls for a gradual reduction of high incentive rates. This will be done, in effect, by withholding increases due in the future for affected jobs.

A scale for computing incentive rates of new employees has been devised. Adjustments of low incentives are provided. A fixed base rate will be used in the future for purposes of computing incentives.

Ends Struggle — For Pittsburgh Steel, the agreement caps a long struggle to eliminate labor costs it considered excessive. The company came out openly last year with figures on earnings and costs. It stated bluntly it had to have relief in order to remain competitive.

Similar to Compromise—Under the contract, a two-man committee was set up to devise a means of setting incentives. The committee, which included a top union expert, submitted its proposal last month.

Two days before the strike deadline, the current agreement, which is said to resemble the compromise proposal, was accepted by both parties.

Big Oxygen Plant Ordered by Ford

A new, large capacity oxygen plant will be built by Dravo Corp. for Ford Motor Co.'s Steel Div. in Dearborn, Mich. According to Dravo it is the first of its size in the U. S. designed to simultaneously produce gaseous and liquid oxygen at low pressures.

The plant, scheduled to go on stream in December, 1961, will have a daily production rate of 280 tons of gaseous oxygen, 10 tons of liquid oxygen, and 1.4 tons of liquid nitrogen.

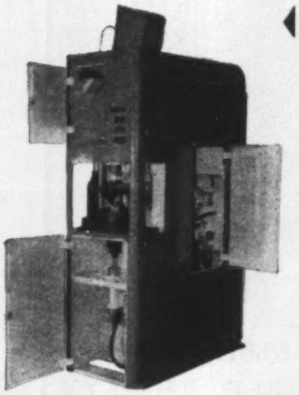
The contract is of special interest because it marks the entry of Dravo into the field of oxygen plant construction.

Denison, Denison HydrOILics, and Multipress are registered trademarks of Denison Eng. Div., ABSCO

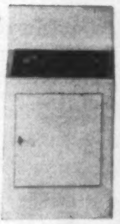
DENISON HydrOILics

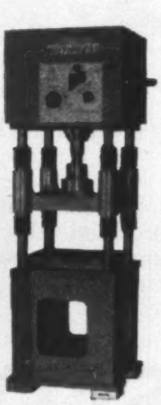
Look at the new and exclusive features DENISON brings you in these two...

NEW PRESSES



MULTI-COMPACTION PRESS *shown with access doors open. Tooling setup shown is for production of tantalum capacitor anodes. Reel of tantalum wire (seen in upper compartment) is straightened, cut to exact length and fed vertically into the press. Powdered tantalum is automatically fed from overhead hopper into compaction die cavity.*





SERVO-DRIVEN MULTIPRESS "600" *with movable console which contains operating controls. Note rugged platen and large daylight area. Control lever on upper panel adjusts ram stroke for ¼", ½", ¾", 1", 1½", 2" and 3" work strokes. Feed mechanism is automatically adjusted when operating speed is varied.*

TWO NEW PRESSES fill the long-standing need for a high speed hydraulic progressive stamping press and a productive, dependable powdered materials compaction press. Here are some of the key features of these advanced new units:

High Speed Servo-driven Multipress "600"

- 600 strokes per minute with 25-ton capacity.
- Strokes per minute and ram pressures are adjustable while press is operating.
- Simple lever adjustment of ram stroke length. Cams can be easily changed for special work strokes.
- Harmonic cam drive automatically sequences the feed mechanism for perfect cycling with ram operation.
- Punch breakthrough is adjustable... does not rely on mechanical stops.
- Press frame and power unit are shock-mounted... resulting in minimum operating noise level.

Multi-Compaction Press

- Designed for volume production of ferrous, non-ferrous and exotic metals... glass and plastics.
- Fully automatic, unattended operation.
- Enclosed tooling area eliminates spillage and loss of material.
- Single or automatic cycle operation... all-hydraulic control.
- Self-contained, overhead stainless steel hopper feed.

Your nearby Denison hydraulic press specialist can show you how the new Multipress "600" and the Multi-Compaction press can help make your products better for less. Call, write or wire for details.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1242 Dublin Road • Columbus 16, Ohio

These two new presses will be demonstrated at the Machine Tool Exposition in Chicago, September 6-16.

MODERN MACHINE TOOLS
MMT-PE
PRODUCTION EFFICIENCY

1960 Machine Tool Exposition
Denison Booth 914

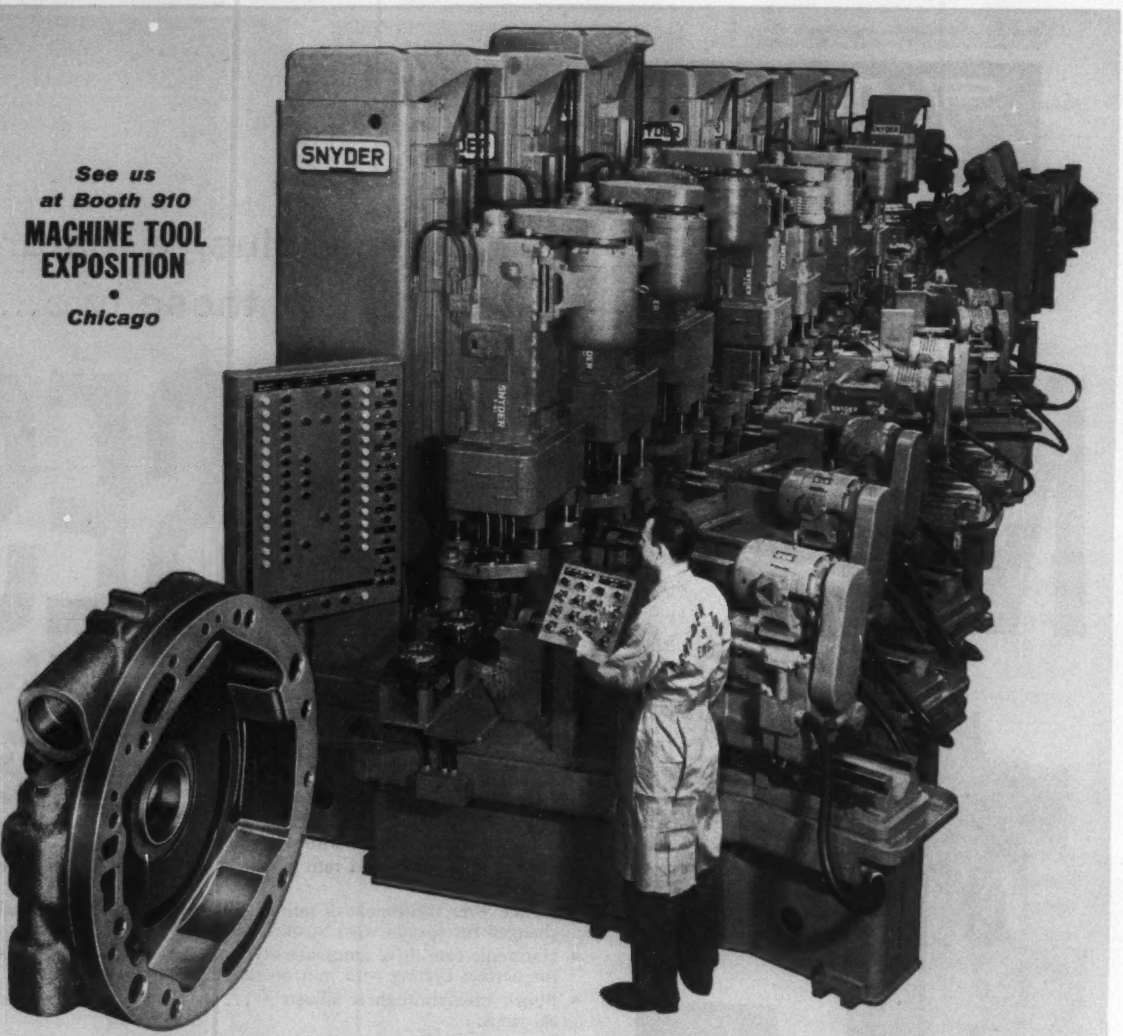
DENISON
HYDRAULIC MULTIPRESS

See us at Booth 910

MACHINE TOOL EXPOSITION

•

Chicago



SNYDER BUILDING-BLOCK PRINCIPLE MAKES TRANSFER MACHINES VERSATILE, CONVERTIBLE, THRIFTY

Transfer machines built up on the "building-block" principle are old stuff at Snyder and we've built all kinds of them—including the ones that turn corners and bring the part back to where it started from, processed from half-a-dozen angles, gaged, probed, automatically inspected in process, washed and dried and rejects marked for re-processing. Nothing to it if that's what the job calls for. We call it the Snyder Building-block Principle.

Here's an example of a fairly simple Snyder building-block transfer. This 58 station machine performs 74 operations on an automatic transmission pump body, drilling, reaming, tapping, gaging and probing 180 parts an hour at 100% efficiency. Any or all of its 22 segments can easily be converted to perform comparable operations on other parts. Also, the number of segments can be reduced or increased at any time, as need dictates. Your inquiries are invited.

SNYDER
CORPORATION
(Formerly Snyder Tool & Engineering Company)

3400 E. LAFAYETTE—DETROIT 7, MICHIGAN
Phone: LO 7-0123

Alan C. Mattison

He's a Top Machine Tool Builder

A leader in the machine tool industry, A. C. Mattison heads the National Machine Tool Builders' Assn.

His knowledge of the industry and capable leadership keep the standards of the association high.

▪ Alan C. Mattison, president of the National Machine Tool Builders' Assn., is a man well suited for that post. His entire business career has been spent as a machine tool builder.

Following his graduation from Cornell University, Mr. Mattison joined the Mattison Machine Works, Rockford, Ill. His job was to learn what went into operating a successful machine tool building company. He spent his time working in all departments of the company until he knew and understood the rudiments of good business. Then, in 1948 he became president of the company, following in the footsteps of his father and grandfather.

Top Man—And last November, because of his knowledge of the industry and his active part in helping to maintain the National Machine Tool Builders' Assn. as one of the leading industrial organizations in the world, Mr. Mattison was elected its president.

He is concerned with the future of the machine tool industry as a whole, as well as working hard to keep his company among the leaders in the field.

Big Threat—Mr. Mattison says one of the greatest threats facing the industry is high pricing that opens the doors to foreign competition. He says machine tool builders must remedy the situation by stabilizing costs and transforming technology into lower prices. The industry must again become competitive, he says.

To insure that his company is doing its best to turn out top quality machine tools, Mr. Mattison keeps a close check on all operations. Each week executives from all departments meet to work over important matters. Also, he reads all mail that comes in so he can keep abreast with all phases of the business.

Daily Tour—Every morning he goes through the whole shop before getting to his office. He makes it a point to stop and discuss matters with anyone wanting to talk to him. This also gives him the opportunity to check on progress of machines being built for customers.

A. C. MATTISON: An industrial leader.

Whenever Mr. Mattison is out of town he visits Mattison distributors and talks with them about new developments in production and works with them on any problems they may have in the field.

Long Day—Outside the Mattison office, Mr. Mattison is a director of Cinrock Machinery, Inc., AMTEA Corp., Mattison-Grenlee Service Corp. and the Illinois Manufacturers' Assn. His memberships include the Woodworking Machinery Manufacturers Assn., American Society for Metals, American Society of Mechanical Engineers and National Assn. of Accountants. With all these duties and his work in his company, Mr. Mattison's work week often is longer than 60 hours.

For recreation Mr. Mattison turns to hunting and fishing. He is a crack rifle shot and shoots with the Mattison rifle team.

Archaic Taxation is Forcing Industry to use Museum Pieces

● The machine tool below is now in the Ford Museum—where it belongs. And although you're hardly apt to find machines as antique as this in industry, the degree of obsolescence in American industry is of dangerous proportions.

While the tax laws of most industrialized nations encourage investment in modern machinery, the tax policies in this country discourage such productive investment.

The consequences are everywhere to behold. The productivity of American industry is being impaired. Countries whose governments offer incentives to modernize are gaining in world markets—at our expense.

Legislation is now being considered which will remove these shackles from our industry. Its purpose is to allow more realistic depreciation, thereby making it possible for industry to buy the machine tools it needs without hurting profit.

Show your employees how up-to-date depreciation makes their jobs more secure. Modern depreciation allowances mean more job security for all employees —yours and ours, a better chance for both of us to compete at home and abroad and faster economic growth for our country.

The Timken Roller Bearing Company
Canton 6, Ohio

Why Profit Pinch Will Continue

Earnings dip in the first half was not solely due to the business slowdown.

It reflects a long-term profit squeeze which is likely to continue.

▪ Even if business picks up, don't look for a big improvement in profits.

A strong second half could firm up 1960 earnings statements. But it's likely the trend noticed in the first half—slimmer profit margins—will continue.

That's because it's not a new development. And it's not solely the result of reduced sales. Rising costs and higher taxes are playing a big part in the profit trim.

The Top Hundred—Several recent studies show clearly what's going on. The First National City Bank of New York, in its August business letter, analyzes the profits of the 100 largest U. S. manufacturers in the last decade.

The study shows profit margins shrank almost 20 pct between 1949 and 1959. The top 100 companies earned 7.9 cents on every dollar of sales in 1949—a recession year. By 1959, net income per dollar of sales was down to 6.4 cents.

Says the First National: "These companies are generating more and more income for others, but are able to keep only a small and shrinking share for dividends and reinvestment."

How Costs Varied—The way the sales dollar was spent also underwent some changes in the ten-year span. The same companies spent 59 pct of each dollar for goods and services in 1949. This expense dropped to 52.3 pct by 1959. But other items increased. Wages, salaries, and labor benefits rose from 23 pct to 27 pct. Taxes took 6.4 pct. of the sales dollar in '49, compared with almost 9 pct last year.

Charges for depreciation and depletion also increased, rising from 3.6 pct to 4.9 pct. This, of course, reflects industry's large investment in new equipment and greater capacity.

Metals Industry Earnings — Another profit study points up the same trend—with emphasis on metal industry profits. It was compiled by the Federal Trade Commission on profit rates in 24 selected manufacturing industries for the years 1940, 1957, and 1958.

Profit rates dropped for 15 of the 24 industries between 1940 and 1958. They rose for only nine. Among the declines: Primary nonferrous smelting and refining, down from 10.6 pct to 6.6 pct.

The trend was even more noticeable in comparing 1957 and 1958. Nineteen industries had lower profits, only five had higher profits.

The results show clearly what the recession did to metals and metalworking. Earnings for blast furnaces, steel works, and rolling mills dropped from 12.4 pct to 8.1 pct.

Some Job Gains Expected

▪ Government surveys show many employers expect modest gains in employment this fall.

Both manufacturing and nonmanufacturing jobs will share in the gains, says the U. S. Dept. of Labor's Bureau of Employment Security. (The Bureau survey employers in 149 major labor market areas in the U. S.)

Seasonal Factors Aid—Seasonal factors will be mainly responsible for the expected gains, it's pointed out.

Employer hiring plans through mid-September show nearly six out of seven areas surveyed expect increases in overall employment. About five out of seven look for manufacturing increases.

Where Gains Will Come—However, non-manufacturing payroll gains are expected to account for most of the advance.

"Moderate" employment increases are due in the auto industry as production of 1961 cars and trucks gets underway. Steelmaking area payrolls should recover some from the present midsummer lows. But almost half the steel producing areas reporting look for little or no improvement before September.

Inventory Buildup Slows Down

Efforts to cut back inventories are reflected in the latest report from the office of Business Economics, U. S. Dept of Commerce.

Total business inventories of manufacturers and distributors, on a seasonally adjusted basis, increased by only $200 million in June. This was the smallest month-to-month gain since last December when inventory rebuilding began.

Vaughn Haynes, right, manager of production engineering, discusses "trap" line scheduling with Wilfred Pascoe, superintendent of press room.

Chrysler blanks strip steel by "trap" shearing on Wean coil processing line

Trapezoidal shearing from coil is, in many cases, the most economical way to prepare blanks for subsequent press operations. Two, independent, pivoting shear heads allow selection of the most economical proportions of the blanks for the finished shapes. This "tailoring" of the material to the end parts eliminates much of the material loss that would result if these same parts were stamped and drawn from square-cut sheets.

Wean has designed and built almost all of the "trap" shear lines used today. The installation shown is at Chrysler Corporation's mammoth Twinsburg, Ohio stamping plant. This Wean coil processing line incorporates strip cleaning, flexing, leveling and shearing operations that turn as-received mill coil into sheet, ready for press work.

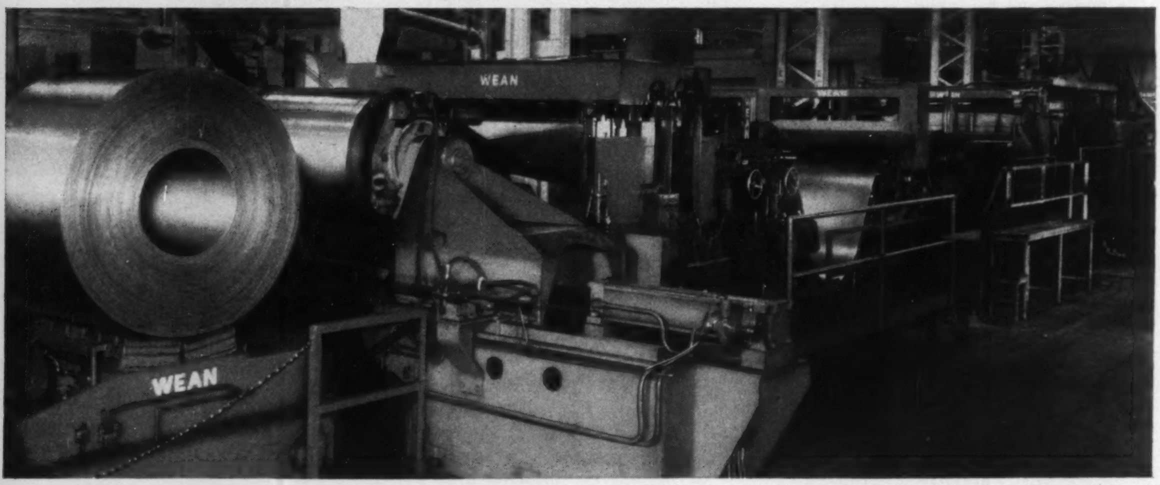
Today, more and more alert metalworking firms are turning to coil processing as one of the answers to rising production costs. If your firm uses approximately 500 tons/month of flat-rolled steel, you may be missing major material and overhead savings if you still purchase in sheet form.

An experienced Wean representative will be able to tell you, or your production executives, if coil processing can cut your costs—and how much. Many firms have amortized the equipment costs involved within one year.

WEAN EQUIPMENT CORPORATION
CLEVELAND 17, OHIO

WEAN

Wean trapezoidal shearing line at Chrysler's Twinsburg Stamping Division plant produces blanks for body stampings from coils weighing up to 30,000 pounds.



Compact Cars Squeeze Profits

Automakers Find Smaller Cars Mean Smaller Profits

The second quarter gave Big Three automakers their first good look at the impact of small cars.

Unit sales were up sharply, but profits went the other way. —By A. E. Fleming.

LESS CAR, LESS MONEY: Compact cars like the Falcon have been selling well, but the smaller cars mean a smaller unit-profit for automakers.

▪ Compact cars seem to mean smaller profits for auto makers.

This is the impression one gets from a reading of first half earnings reports by the Big Three.

Chrysler Corp., Ford Motor Co., and General Motors Corp. as a group sold nearly 600,000 more new cars and trucks in the first half of 1960 than in January-June 1959. But their combined profits sank $33 million below a year earlier.

All Are Affected — Ford and Chrysler, who are putting more emphasis on compacts than GM, fared poorest in the cash register department. But GM was not unaffected. The largest of the auto companies rang up record dollar sales, but earnings failed to measure up proportionately.

A first quarter lapse in earnings could be attributed in part to premium prices auto makers paid for steel ordered during the strike in late 1959 and early 1960. This was less of a factor in the second quarter, however, and profits still kept shrinking.

In the case of Ford, the low level of second quarter earnings even surprised many financial experts who had predicted profits would be about $15 million higher than they eventually wound up.

Sales Success—Ford stands out this year as a clear example: Compacts and lower profits apparently are going hand in hand at companies which must tool up for and market medium-price and high-price cars as well as compacts.

The company is the leading builder of compacts this year. It has already turned out over 500,000 compact cars and trucks in the 1960 model period. In July, 44 pct of Ford Motor Co.'s car output was Falcon and Comet models. Falcon took 30 pct of volume, Comet 14 pct. For the whole auto industry compacts accounted for 26.5 pct of car production.

In short, Ford's compacts can be rated nothing less than a roaring success on the assembly line and in the dealer showroom. But when profits are audited, another picture emerges.

Profits Dwindle — The company sold 1,215,000 cars and trucks in the first six months of 1960, a 7 pct improvement over the 1,134,000 units in the same 1959 period. But dollar sales fell 2 pct to $2844 million from $2954 million, and profits dipped an even greater 7 pct to $264.8 million from $285.9 million.

Chrysler Comments — Whereas Henry Ford II made no reference to the compact's role in his company's lower profit, L. L. Colbert, Chrysler Corp. president, did.

"Net earnings for the first half reflect the lower profit margins of economy cars (Valiant and Dodge Dart), as well as substantial expenditures for steel at premium prices in order to maintain production schedules in the period immediately following final settlement of the steel strike," he remarked. "In meeting this new pattern of customer preference for economy cars, the company has intensified programs to reduce expenditures in all operations."

Volume and Profits—At General Motors, like Ford, reference to compacts and profits was avoided in the financial report. Unit sales moved up 15 pct over a year ago, 2,659,000 units against 2,309,000. Dollar sales were up a lesser 9 pct to $7109 million from $6512 million. Profits climbed a still smaller 4 pct to $612 million from $590 million.

GM, with the only increase in profits over the last year among the Big Three, gave only 8 pct of its U. S. car production to the compact Corvair in the first half of 1960. At Chrysler, the Valiant was responsible for 25 pct of car output; at Ford Motor Co. the Falcon and Comet took 33 pct of car output. This seems to tie together smaller cars and smaller profits.

Other Factors—Of course, compacts can't absorb all the blame for the profit imbalance this year. The cost of premium steel has been a factor. Then, too, wages have risen slightly because of an increase this year in cost-of-living adjustments. And materials costs are up in some cases.

But compacts are an important factor. If profits are to increase, several moves would seem to be indicated. Efforts to substantially boost compact car volume is one step. Another is to make compacts more luxurious, meaning more costly. Mercury's Comet started this trend in March.

Luxury Compacts — Chevrolet's introduction last May of the Monza 900, sporty dream car version of the Corvair, followed it up. So will introduction of the larger, higher-priced Buick, Oldsmobile, Pontiac and Dodge compacts in the next few months. It means the profit differential between compacts and standard-size models will become smaller.

With the trend toward compacts showing no signs of diminishing, the car maker that can sell the greatest number of compacts is likely to be the one that will pull in the profits in the next few years. This is probably one reason why there are no words of regret over compacts and smaller profits today.

British Offer Heavy-Duty Trucks

HORSEPOWER: A Clydesdale is a strong workhorse. And the Leyland Clydesdale, first British-made heavy diesel truck to be offered for sale in the U. S., is a workhorse too. This model has a gross vehicle weight of 32,000 lb with a payload of 21,900 lb.

Premium Steel Cost is High

What price steel? For American Motors Corp. it was $12.5 million for premium steel bought because of the steel strike.

The company paid for the last of the premium steel in its third fiscal quarter, which ended June 30. The $12.5 million charge resulted, according to AM, from steel source refusal to cover the car maker's scheduled requirements because sources anticipated an acute steel shortage running through spring.

Despite its cost, the purchase of premium steel permitted the company to produce on an uninterrupted basis. The company was able to stay close to projected schedules during the steel shortage and to keep up Rambler's sales momentum, according to president George Romney.

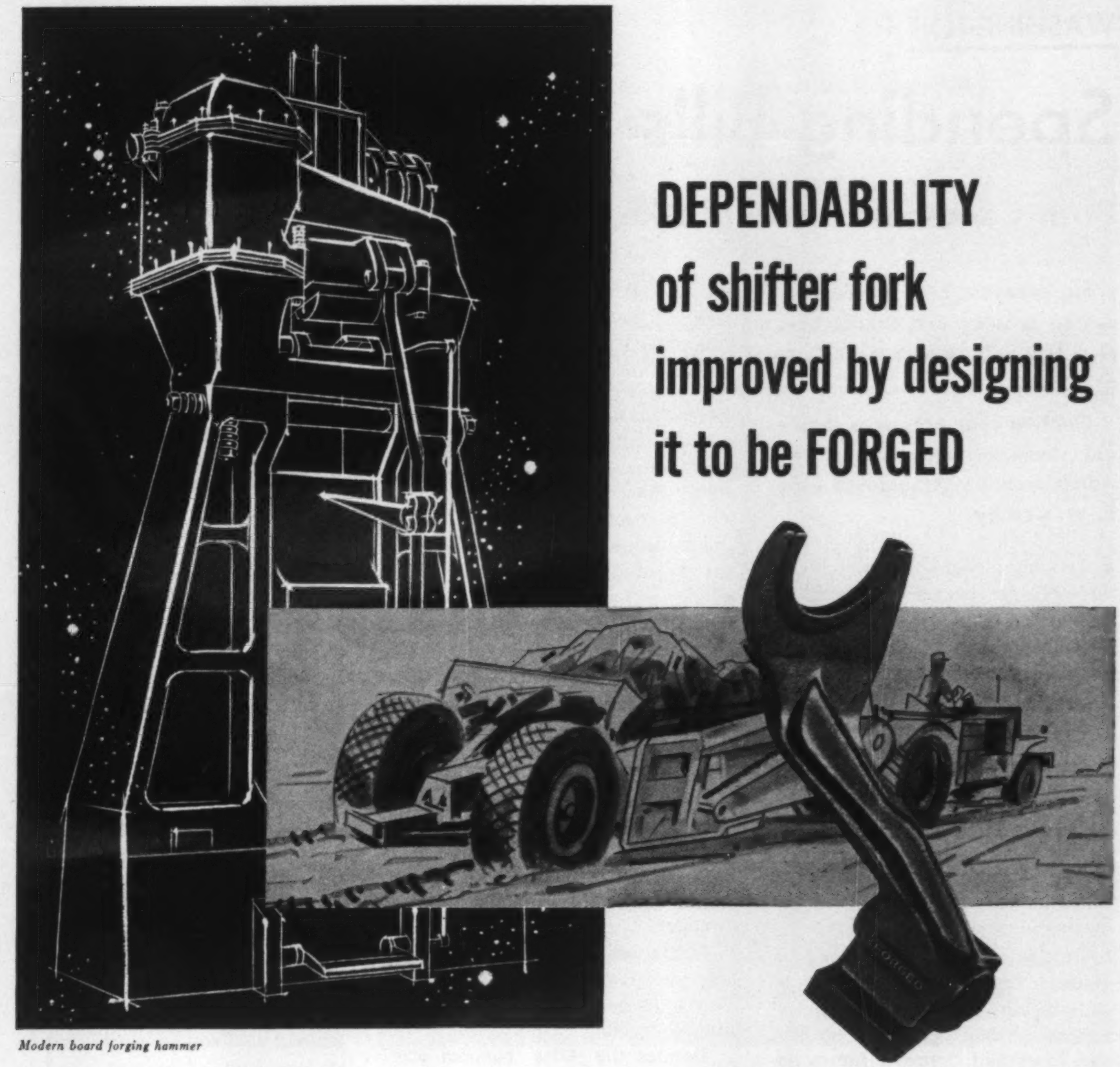
Aerospace Company Comes to Earth

Aeronutronic Div. of Ford Motor Co. is moving into the field of automotive electronics.

According to G. J. Lynch, vice president of Ford's Defense Products Group and general manager of Aeronutronic, located in Newport Beach, Calif., "The newly established automotive electronic equipment operations represents an important additional step forward in the application of Aeronutronic's scientific talent and accumulated fund of knowledge in the interests of private industry, commerce and the individual consumer."

He predicts the use of advanced electronic technology to automotive products in general will expand at a tremendous rate in the next 10 years.

DEPENDABILITY of shifter fork improved by designing it to be FORGED



Modern board forging hammer

By designing the shifter fork of his transmission to be forged, a manufacturer of earthmovers eliminated costly equipment breakdowns in the field because of fork failure. Factor of safety was *in*creased even while weight and over-all costs were being *de*creased.

Parts scrapped because of voids uncovered after much high-cost machining are eliminated . . . forgings are *naturally* sound all the way through. Forgings start as *better* metal . . . are further *improved* by the compacting hammer-blows or high-pressure of the forging process.

Design your parts to be forged . . . increase strength/weight ratio, reduce as-assembled cost, improve performance. Literature to help you design, specify, and procure forged parts is available on request.

When it's a vital part, design it to be **FORGED**

Drop Forging Association • Cleveland 13, Ohio

Names of sponsoring companies on request to this magazine

Spending Bills Should Get OK

Both Candidates Would Like To See Them Passed

Big spending bills for Federal aid to housing and school construction will be up before Congress soon.

Election year pressures should get them through, even if the Administration is opposed.—By R. W. Crosby.

▪ Two big spending bills which will probably get passed in this rump session of Congress—Federal aid to housing and school construction—are of particular interest to the steel industry.

At the end of the regular session of Congress these two bills were stalled in the powerful House Rules Committee. Both were opposed by the Administration.

Omnibus Bill—The Senate passed a $1.8 billion omnibus housing bill, including authorization of 25,000 public housing units estimated to cost $600 million.

The House Banking Committee has approved a bill authorizing $1.3 billion, without any public housing spending. But the rules committee kept the bill from a floor vote.

The Rules Committee also tied up the Federal aid-to-education bill. It refused to let the House and Senate meet in conference to adjust differences in their bills.

For Education—The House passed a $1.3 billion bill limited to school construction. The Senate passed a $1.8 billion measure for both school construction and teachers' salaries.

Even though the President has threatened to veto big spending bills such as housing and school construction, these bills now have a chance of becoming law.

Vice President Nixon, the Republicans' nominee for President, would like to see them get through. And Mr. Eisenhower may accede to his wishes.

Important Bypass—In this session the House can bypass its Rules Committee and get action on the bills. When the House assembles on Monday you can expect movement to get immediate action on the bills.

Despite efforts of candidates to get these bills enacted, what Sen. John F. Kennedy describes as a "beneficial effect on steel production" remains to be seen.

Another bill of interest to industry is one calling for a tax deduction for lobbying by businessmen.

Deducting Influence — The bill, approved by the House Ways and Means Committee, would permit business to deduct from gross income the cost of influencing action by Congress, state or other legislatures. It would also allow business to deduct money used to influence the voters themselves on proposals submitted to them by referendum.

Such deductions could be claimed as long as the expenses qualify under the test of existing law as "ordinary and necessary" to the conduct of business.

Missile Speedup Wanted

▪ The Defense Department has asked industry to help speed up the lagging U. S. missile program.

Defense Secretary Thomas S. Gates Jr. called 56 industrialists to Washington and asked them to tighten up their operations on missile bases and "prevent future delays."

Closed Doors—Mr. Gates summoned the company heads—most of whose firms hold Air Force ballistic missile contracts — after disclosure that some Atlas base construction had fallen as much as five months behind schedule.

At the unprecedented, closed door conference, Mr. Gates stressed the "urgency" of the program.

If a "real effort is made," the Pentagon chief said, "we have a fighting prospect of getting back on schedule by the beginning of the next calendar year."

What's Wrong—Cited for the delay were inexperience in working with the new weapons, shortage of needed skilled workers, and labor troubles.

Labor was not represented at the meeting. But labor leaders are expected to be called in soon for a similar meeting.

Besides the Atlas, concern was expressed also over schedules of the Titan and Minuteman missile programs.

Urgent Situation — Most of the "urgency," however, was tacked on to the construction of Atlas bases. The missile bases immediately concerned are Vandenberg Air Force Base, Calif.; Warren AFB, Cheyenne, Wyo., and Offutt AFB, Omaha, Neb. Together, they have four squadrons of Atlas missiles with a total of 30 launchers which have been hampered by base construction delays.

The Air Force pledged to cooperate in the speed up. The first step planned was a centralization of work at site constructions.

JONES & LAMSON
MACHINE TOOLS

the man who needs
a new machine tool is
already paying for it

It's Useful . . . but is it still Profitable?

Provide competent people with the proper equipment, and you have the key to sustaining a sound, healthy business condition.

Incompetence in people is detected sooner than later, and they are replaced. It's the value of the equipment that fools most of us. Just because a machine still runs, possibly as well as when new, it's generally considered as useful. But it's not *usefulness* that brings home the bacon — it's *profitableness.*

New, improved methods, and the machines to implement these methods, are being created constantly. If your methods and equipment do not stay abreast of competition, at the least, you inevitably will be out-produced, out-priced, and out of business.

Most of the really good new machine tools now available to industry will pay for themselves in a short time, and will roll up profits besides. We think this is true for some other makes of machines — and we *know* it is true for each and every item in the complete line of Jones & Lamson equipment.

J & L machines are easier to acquire than you may think, too.

Investigate the new J & L Profitivity Lease Plan. It requires no money down, no advance payments — in fact, no payments of any kind are required until thirty days after the machine has been shipped.

Write to Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vt. for Machine Replacement and payment plans.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Economic Future Good In Hawaii

Basic Indicators, Income Near New Highs

Business is booming in Hawaii. But this presents problems too.

An economist looks for a good third quarter. The growth rate should slow down by the end of the year.—By R. R. Kay.

▪ Business is booming in Hawaii. But even the Islands have their problems.

Basic indicators and personal income are moving to new highs. Construction is good.

The third quarter outlook calls for more of the same, followed by a milder growth rate toward the end of the year.

That's the prediction of the Islands' leading economist, Dr. James H. Shoemaker. He's vice president of the Bank of Hawaii and director of its Dept. of Business Research.

The Focal Point—But no boom lasts indefinitely. The island of Oahu, with Honolulu its focal point, is the center of Hawaii's economy. Its two-year boom points up the need for a new look at expansion programs. Now is the time for reappraisal, Dr. Shoemaker warns.

Construction is a big user of steel and other metalworking goods. During the past five years, the building industry has been going at the fastest pace in Island history.

For example, it jumped from $97 million in 1955 to $219 million in 1959. So far this year, construction is 20 pct above the same 1959 period.

Good Economy—Dr. Shoemaker believes that the economy of Oahu will soon overcome its housing shortages. And if the present rate of expansion continues, new office buildings, apartments, and homes could begin glutting the market.

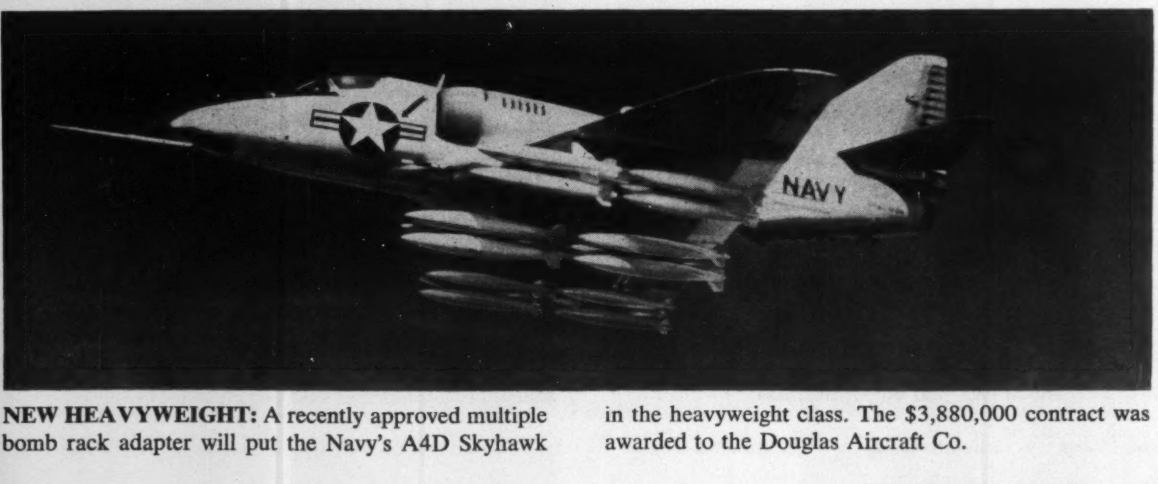
Many Hawaiian business and industrial leaders also warn about the boom conditions there. And they admit that there are problems ahead.

The Critical Point — Hawaiian Electric Co.'s president, Ralph N. Johnson, says, "Hawaii is at a critical point in its growth . . . economically, sociologically, and physically. More than $100 million of capital has been invested in the establishment of new and expanding industry on Oahu since 1955. . . . We believe that this trend will continue. Proper planning now can point the way to harmonious development."

To do something about it, Hawaiian Electric Co. is broadening its Industrial Development Section into an Area Development Office. Rollin C. Bacher, its manager, told The IRON AGE that he will continue to attempt to lure new industries to Hawaii.

"But from now on," says Mr. Bacher, "one of my office's key roles will be to assist in making certain that through good planning the Islands will have orderly development."

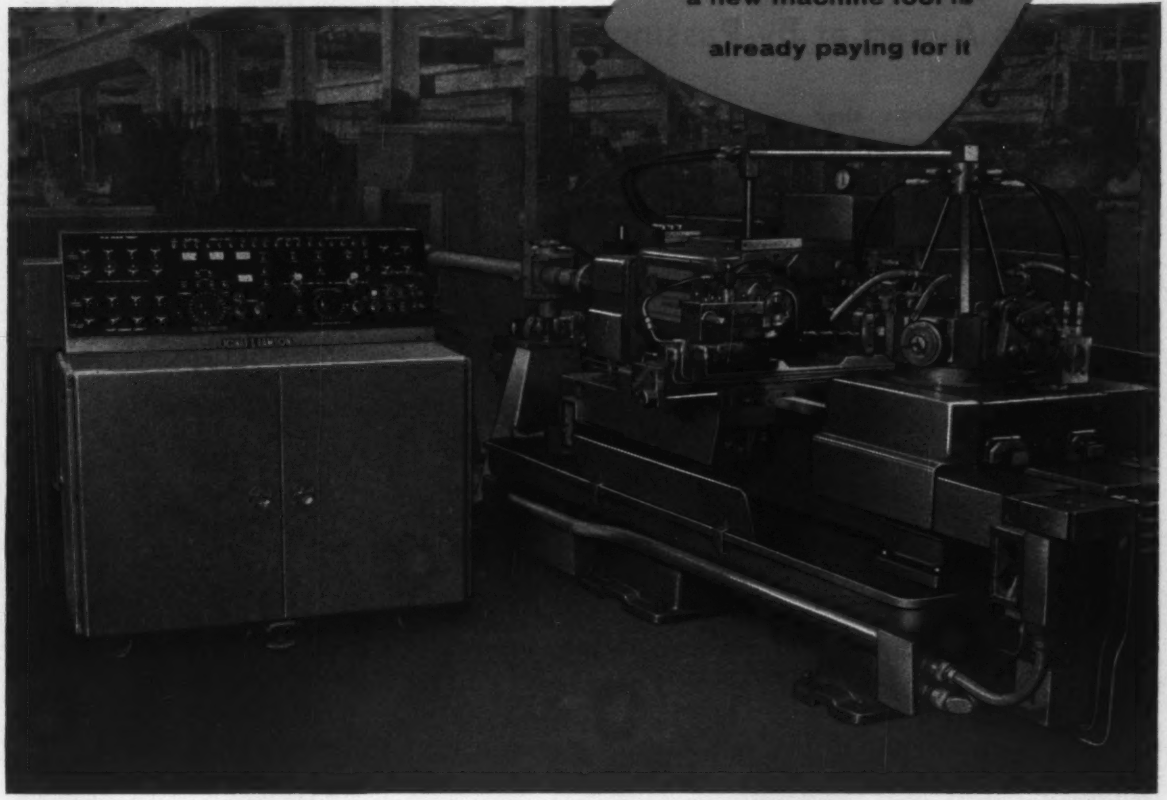
Douglas To Make Multiple Bomb Rack



NEW HEAVYWEIGHT: A recently approved multiple bomb rack adapter will put the Navy's A4D Skyhawk in the heavyweight class. The $3,880,000 contract was awarded to the Douglas Aircraft Co.

JONES & LAMSON
"AUTOMATION"

the man who needs
a new machine tool is
already paying for it



New numerically-controlled turret lathe shatters idle time . . . is ideal for short runs

At the last Machine Tool Exposition, five years ago, Jones & Lamson exhibited an automatic tape-controlled turret lathe. It created a sensation and attracted thousands of fascinated spectators. Many of them wanted to buy. But the machine wasn't for sale. Why? Because there were still "bugs" in it to be ironed out, and our reputation is too valuable to risk on an "almost" product.

In the five years since, J & L still kept this lathe off the market, pending its complete development and proving-out. Now, it is ready to be shown, ready to be sold, ready to help you attain new production efficiency.

The new J & L numerically-controlled turret lathe is a complete redesign job. The sound features of the early prototype have been retained, and all question marks have been eliminated. In every way, this is a real beauty!

It's designed especially for short run production and top economy. It has the capacity of a No. 5 machine, 2½ x 24 in., and has three turrets (one hexagon and two square) which accept up to 14 preset tools. A set of tools plus the tape can be "packaged", ready for set-up when needed.

This lathe can be set up as either a bar machine or a chucker, in 10 to 15 min. It positions within .001″, repeats to .0005″. Drive motor is 30 HP, with spindle speeds of 40 to 2000 rpm in 24 steps. Feed rates for carriage and saddle are .750″ to 30.0″ per minute in 16 steps, plus fast motion. Cross-slide operates at one-half these rates. Tape input information may be adjusted for extended tool life and size control by manual dials on the control panel. Productivity is increased 25 to 30% over standard cycle time. Even the automatic bar feed is programmed from the tape. See it at Chicago, or write for advance information now. Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

Seek Shortcut to Machining Data

Project Is Aimed at By-Passing Expensive Tests

Determining machining characteristics of the flood of new materials is time consuming and costly.

U. of M. researchers will try to develop method to predict them quickly and inexpensively. —By R. H. Eshelman.

▪ Just what is machinability? That question has led the National Science Foundation to put up $37,000 to find out. And it's far from academic.

Much is known about the machining behavior of the more common metals and alloys. But it's been learned mainly through long experience and by elaborate and expensive cutting tests.

Is there a scientific shortcut? A Univ. of Michigan engineering professor thinks so. And on the basis of promising studies, based on formability studies, the foundation is betting that he and his associates will find the answers.

An Equation—"This project is to try to predict the machinability of the materials without the need of machining tests," Prof. Joseph Datsko explains. "For a good many materials, we can look at the published physical data and from this we can explain the differences in their machinability. For example, we study properties of 24-S aluminum and 1020 steel. And we can point out why the aluminum is more machinable."

Three properties he believes most pertinent: Tensile strength, thermal conductivity and abrasiveness. Using these as a taw mark, he says it seems logical some quantitative relationships can be found. Next step would be to establish a scale or equation to apply to all materials. It would express values in terms of machinability.

Old and New—Big reason for this research is the growing number of new materials. By the usual experimental methods machining tests are becoming too costly and slow for the rapid advances of technology. For instance, in the 1950's the U. S. government spent almost a million dollars to determine by tests the cutting behavior of titanium and its alloys.

In this three-year research program Prof. Datsko is setting out to examine many of the newer materials, as well as the old standbys. Molybdenum, tungsten, aluminum alloys and plastics, as well as high-temperature steels are on his list.

Previously, Prof. Datsko and an associate plotted the correlation of bendability of materials with their tensile properties. They developed a formula to predict minimum bend radius for a material from percentage reduction of area as determined by standard tensile test.

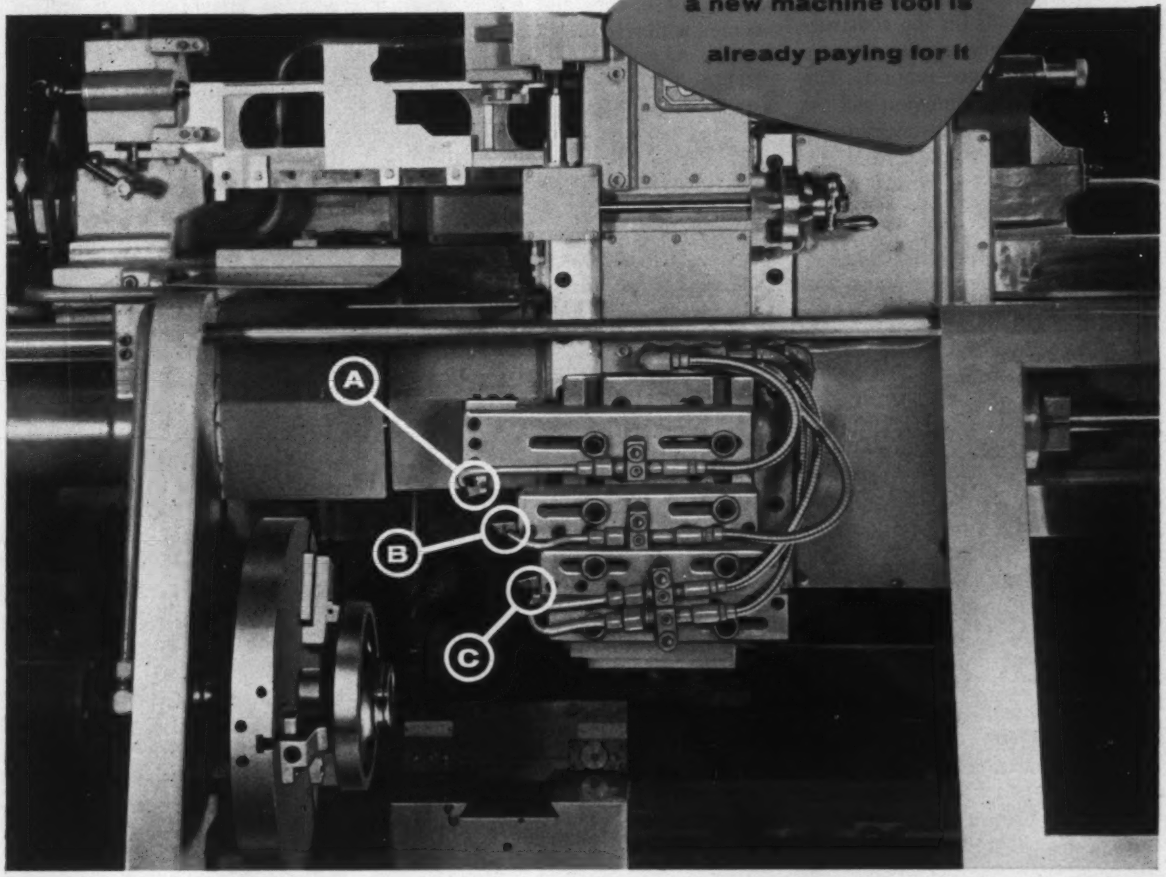
Speed Applications — Although immediate goal of this research program is a means of predicting tool life curves of new materials, it may trigger even more profound results.

It could lead to scientific breakthroughs in many areas of metals technology. These might include forecasting processing characteristics of materials in forming, welding, forging, and casting as well as machining. They would sharply cut the lag in application of materials developments and discoveries.

CLOSE CHECK: U. of M. researcher Joseph Datsko (center) checks progress of tensile and tool life tests in engineering laboratory.

JONES & LAMSON MACHINE COMPANY

the man who needs
a new machine tool is
already paying for it



Multiple Tool for a Fully Automatic Two-Dimensional Tracing Cycle

The two-dimensional tracing slide on the new Jones & Lamson Model 30 Automatic Tracing Lathe provides a new opportunity for multiple tooling on tracing operations. In addition, this slide offers eight different tracing cycles for tool motion — each of which controls tool travel through a full 180° of motion.

Automatic speed and feed changes during a cut allow for the proper cutting speeds on varying diameters, resulting in longer tool life, better cycle time, and desired surface finish. *For Example:* The illustration above shows the machine as it is tooled up for one of a variety of sizes of gear blanks. Three tools on the tracing slide machine the various surfaces of the blank in one completely automatic cycle. Tool "A" approaches the work first. It chamfers and turns the O.D. At the end of the turn, tool "C" is in position to chamfer and face the contour of the hub. As this is completed, tool "B" faces the piece, contours the large radius at the flange and faces the flat surface at the face of the gear blank O.D. Automatic speed and feed changes may occur as each tool is engaged.

Multiple tooling of tracing operations not only shortens tracing cycles, but also offers the opportunity for proper tool geometry for each particular phase of the operation. Set-up from one job to another is accomplished in a matter of minutes by graduated dog rings on the conveniently located control drum.

You can see this machine in operation at the NMTBA Exposition, Booth #839, in Chicago. Or you can get detailed information now by writing for Catalog No. LO-6011. Jones & Lamson Machine Company, 511 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

INDUSTRIAL BRIEFS

B-L-H Contract—A $2.3 million contract has been awarded Baldwin-Lima-Hamilton Corp., Philadelphia. The contract calls for the construction of a pressure vessel, pressure vessel liner and core support. The Atomic Energy Commission will use the products in its experimental gas-cooled reactor at Oak Ridge, Tenn.

Betatrons Available—Allis-Chalmers Manufacturing Co. has announced that its betatrons are now available under a lease agreement. The first lease has already been entered into. It involves a 25-million volt betatron for an Ohio medical building.

Army Contracts—The Army has granted several contracts totaling $18 million to the Western Electric Co. The contracts call for furtherance of work on the Nike Zeus anti-missile missile system. Under the new contracts, manufacturing techniques will be developed to make possible volume production of Nike components.

Uranium Plant—The Atomic Energy Commission and Susquehanna Western Inc., Denver, Colo., have signed a contract for construction of the nation's 26th uranium ore processing plant. The plant will be built near Falls City, Tex. Estimated cost of the project is $2 million. It will have a rated capacity of 200 tons of ore per day.

Groundbreaking Ceremonies — Groundbreaking ceremonies were recently held in East Butler, Pa., for construction of a new building for Magnetics Inc. The building will cost $400,000. It will house the company's expanded research and development facilities.

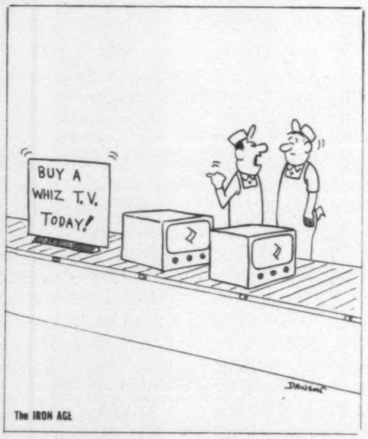
Construction Started—Work on a new can manufacturing plant in New Jersey has started for the National Can Corp. of Chicago. The plant, approximately 200,000 sq ft in area, is located near Metuchen. Construction of the building is being handled by Brown & Matthews, Inc.

Design Handbook — The Wire Reinforcement Institute has published the new WRI Building Design Handbook. It is intended for use by designers, engineers, architects, consultants and others concerned with reinforced concrete construction. Address requests to Dept. BH-70, WRI, 1049 National Press Bldg., Washington 4, D. C.

Service Offered—A new service for metal fabricators, users and suppliers is being offered by The Witt Cornice Co., 4454 Steel Place, Cincinnati. The company has been producing custom hot-dip galvanizing. Having recently moved to a new plant with expanded facilities, it will now handle a pickling and oiling service.

Change of Name — Hi - Shear Rivet Tool Co. is now officially known as Hi-Shear Corp. The Torrance, Calif., company announced the name change effective Aug. 1. Hi-Shear Corp. also recently moved into additional factory and office facilities at the Torrance Municipal Airport.

A New Division — Fairbanks, Morse & Co. is establishing a new Electronics Div. to coordinate its present domestic engineering, manufacturing and sales facilities with the importation and marketing of products made by E. M. I. Electronics, Ltd. of Hayes, England. The new division will open a headquarters and new plant in West Hartford, Conn., Sept. 1.



"Here comes the darn commercial!"

A New Contract—A $22 million contract covering electrical drives, motors and controls has been announced by the Westinghouse Electric International Co. The contract is with an integrated steel mill in Brazil. It is one of Latin America's largest industrial projects. Companhia Siderurgica Paulista (COSIPA) is building the mill. By 1962 it will have an initial annual capacity of 600,000 tons of sheets and plates.

Dow Takes Options—The Dow Metal Products Co. has taken a six months' option to buy land, buildings, and equipment of Sheet Aluminum Corp., Jackson, Mich. Sheet Aluminum, producer of rolled aluminum products, is a subsidiary of Mueller Brass Co. During the option period, products of Sheet Aluminum will be sold by its own sales force and through Dow sales offices.

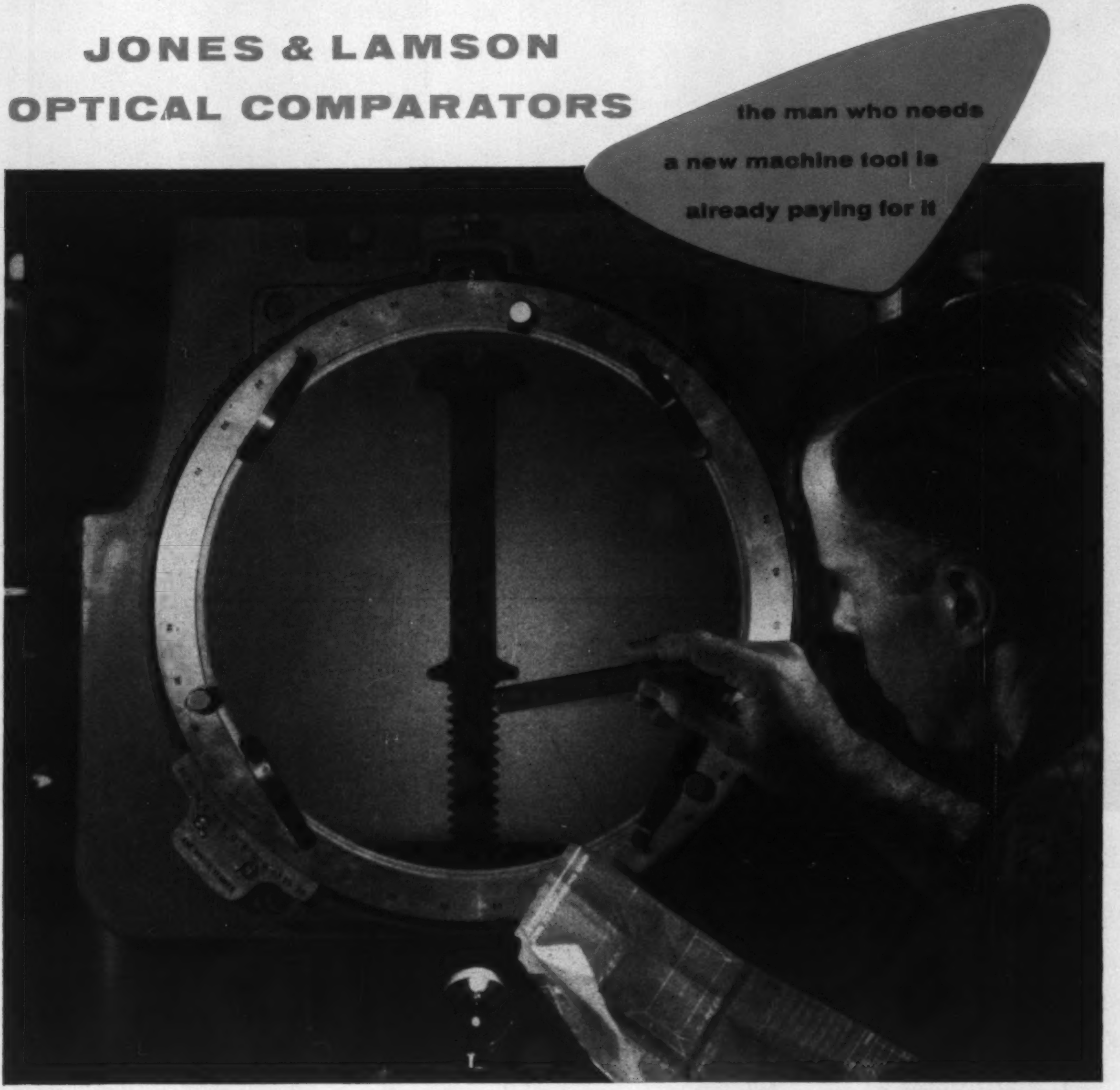
Scientific Advisor — Dr. K. E. Shuler has been appointed consultant to the director, National Bureau of Standards. He will serve as scientific advisor to the director in connection with the Bureau's efforts to strengthen its basic scientific program. Dr. Shuler is an authority in the fields of chemical kinetics, statistical mechanics, energy transfer, and molecular spectroscopy.

Division Transfer—A. O. Smith Corp.'s Special Products and Tool Manufacturing Div. has been transferred to the company's Automotive and Railroad Products Div. Also, automotive tool design has been assigned to the division.

New President—Roy E. Blue has been elected president of the American Powder Metallurgy Institute. He is chief product engineer of the Amplex Div. of the Chrysler Corp. He succeeds Robert C. Burgess.

Navy Contracts—The Navy has awarded two contracts totaling $1,330,000 to Rocketdyne, a division of North American Aviation, Inc., for production of solid propellant gas generators and for research and development for advanced technology in solid propulsion.

JONES & LAMSON
OPTICAL COMPARATORS



J & L Optical Comparator is a production tool

At John Hassall, Inc., Westbury, L. I., nails, screws, rivets, fasteners, and other small parts are "Job-Designed" to satisfy the customer whose requirements cannot be adequately met by the standard item.

Rigid AN (military) specicfiations are strictly adhered to whenever required. In all cases, the Jones and Lamson Optical Comparator has become an almost indispensable production tool.

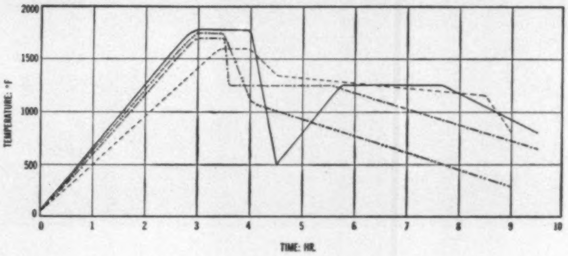
In the cold heading process used at Hassall, the J & L Comparator acts as a monitor for controlling the essentials of the production process. *Tools* for manufacture of dies are checked for proper cutting edge and angle. *The dies* themselves are checked for cavity contour and angle by taking plastic impressions. *Finished parts*, accurately magnified 10 times under the critical eye of the Comparator, are checked at a glance for tolerances. But, even more importantly, this inspection gives essential information as to when and where dies may be worn, or where other areas of the *manufacturing process* should be changed. How easy it is for production control and tolerance requirements to be maintained!

J & L Comparators, featuring magnifications up to 250X are ready to go to work for you. Write for literature. Jones & Lamson Machine Company, 511 Clinton St., Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

SELECT YOUR PRODUCTION AND DIAL YOUR CYCLE . . .

with this Salem-Brosius Continuous automatic cycle annealing furnace



Salem-Brosius cycle annealing and other heat treating furnaces are engineered to conform to your most exacting product specifications. Wide range heating and cooling cycles can be varied quickly and programmed positively—with a single operator—permitting you to handle a range of heat treating jobs with a single furnace. Such furnaces are built for continuous operation or as batch types, with conventional firing or controlled atmospheres. Your requirements govern design.

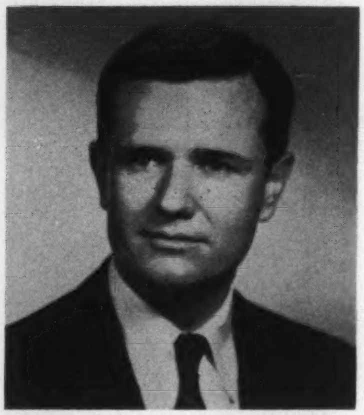
Both in the United States and abroad, Salem-Brosius is recognized for its outstanding design and construction of industrial furnaces—furnaces that yield maximum high-quality output at minimum capital, operating and maintenance costs.

When you need heating or heat treating furnaces, check with Salem-Brosius for advanced design and common-sense construction.

Salem-Brosius, Inc.

PITTSBURGH, PENNSYLVANIA

Salem-Brosius (Canada) Limited, Rexdale, Ontario • Salem-Brosius (England) Limited, London and Milford, England
Salem-Brosius (France) S.A., Paris, France • Salem-Brosius (Luxembourg) S.A. • Alloy Manufacturing Corp.,
Pittsburgh, Pa. • R. H. Freitag Manufacturing Div., Akron, Ohio • General Ionics Corp., Pittsburgh, Pa.



J. T. Jackson, appointed vice president, management planning, Remington Rand Div., Sperry Rand Corp.

Union Carbide Corp. — **H. S. Bunn,** elected vice chairman of the board and **Birny Mason, Jr.,** elected president.

U. S. Steel Corp., United States Steel Products Div.—**C. R. Justice,** appointed vice president, sales.

Textile Machine Works—**H. G. Fiedler,** elected senior vice president.

Lapointe Machine Co. — **J. W. Dopp,** named vice president.

Cometals, Inc.—**N. J. Muskin,** appointed vice president.

The Cleveland Cap Screw Co.—**H. H. Willett,** elected director, industrial relations.

International Div., U. S. Industries, Inc.—**M. L. Mandeville,** appointed president.

Electric Autolite Ltd. — **W. F. Purves,** named president.

The Coggins-Owens Co.—**R. D. Casey,** named vice president, sales.

Mueller Co.—**Jackson Kemper,** named executive vice president.

National-Standard Co., Wagner Div.—**W. A. Spies, Jr.,** named manager, sales and engineering.

Whitehead Metals Inc.—**W. F. Gilligan, Jr.,** appointed manager, New York branch.

Air Reduction Sales Co.—**B. G. Harrington,** appointed manager, Kansas City district.

Luria Bros. & Co.—**R. D. Odle,** will head Stainless Steel and Alloy operations at all yards of the company and its subsidiaries in the United States and Canada.

Stromberg-Carlson Div., General Dynamics Corp. — **F. R. Heyner,** named district office manager at Bedford, Mass.

Allis-Chalmers Mfg. Co.—**J. C. Shupe,** appointed projects manager, Pittsburgh Works, and **W. A. Rode,** as works comptroller.

P. A. Dayman, appointed manager, operating statistics, Laclede Steel Co.

General Motors Corp.—**W. B. Ardery,** appointed manager, Washington office.

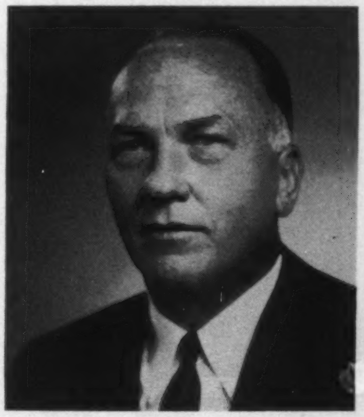
International Business Machines Corp.—**T. E. Clemmons,** appointed director, advanced studies.

F. J. Stokes Co. of Canada, Ltd. **R. D. Wilson,** appointed general manager.

Hoover Ball Div., Hoover Ball & Bearing Co.—**J. R. Brashears,** named general manager, and **C. E.**

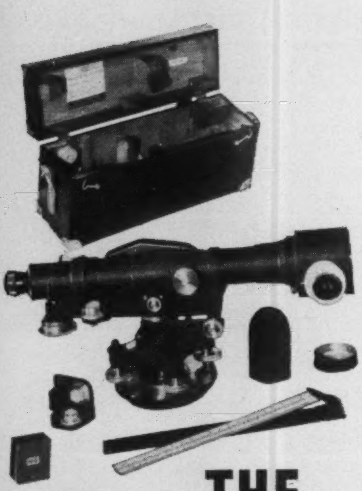
(Continued on P. 176)

David Swan, appointed vice president, technology, Union Carbide Metals Co.



J. C. Douglas, appointed vice president, operations, Union Carbide Metals Co.

R. C. Colbaugh, Jr., appointed vice president, industrial engineering, U. S. Steel Corp.



THE K+E OPTICAL LEVELING KIT

A New Approach to Industrial Leveling

Almost any industrial leveling operation can be done faster and more accurately with optics.

Among the major uses for optical leveling today are:

- Foundation and bed plate leveling
- Profiling
- Differential leveling
- Checking the movement or settling of heavy machinery

The K&E Optical Leveling Kit contains all the elements required to initiate this better system right away in your plant.

A comprehensive brochure describes the K&E kit, and how to use it. For your free copy return the coupon below.

OPTICS AND METROLOGY DIVISION

KEUFFEL & ESSER CO.
Hoboken, N. J. IR-8

☐ Please send me complete details on the new K&E Optical Leveling Kit

☐ Would also like copy of new catalog describing full line of K&E Optical Tooling and Industrial Alignment Equipment.

2046

Name__________

Title__________

Company__________

Street Address__________

City_____ Zone____ State_____

(Continued from P. 175)

Bowman, appointed asst. general manager, and **H. E. Smith,** sales manager.

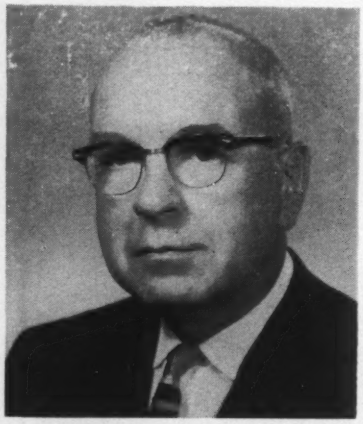
The Eastern Malleable Iron Co.—**J. W. Green, Jr.,** appointed managing director, Wilmington, Del., plant.

A. P. Moran, elected vice president-treasurer, U. S. Industries, Inc.

Chase Brass & Copper Co.—**D. M. Andrews,** appointed director, production planning and control.

Cleaver-Brooks Co.—**Robert Fietsch,** named Canadian district manager.

Ford Motor Co., Ford Div.—**J. E. Acker,** appointed manager, Metuchen, N. J., assembly plant and **C. T. Baughman,** appointed asst. plant manager.



J. R. Reinsma, appointed manager, product programs, Alemite and Instrument Div., Stewart-Warner Corp.

J. R. Alexander, elected vice president, sales, The New Jersey Zinc Co.

The Youngstown Sheet & Tube Co.—**J. J. Tomko,** appointed supervisor, Maintenance, Planning and Scheduling Dept., Indiana Harbor Works; **F. W. Schweitzer,** named asst. supervisor.

The Carpenter Steel Co.—**W. J. Ervin,** named asst. to midwestern regional manager, Indianapolis office and warehouse.

R. A. Ferguson, named manager, marketing, Latrobe Steel Co.

Patterson - Emerson - Comstock, Inc., Iron and Steel Div.—**R. J. Brady,** appointed sales manager.

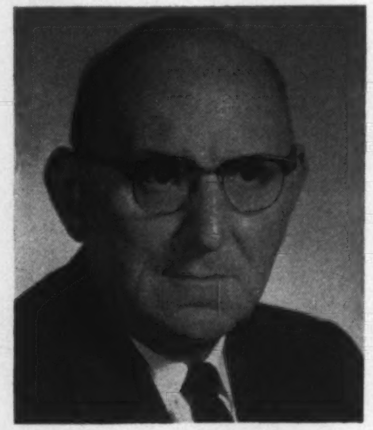
Jones & Laughlin Steel Corp., Audit Div.—**J. R. Fleming,** appointed manager.

American - Standard, Industrial Div.—**A. F. L. Anderson,** appointed

(Continued on P. 177)

(Continued from P. 176)

director, value analysis; **M. P. DeLisio,** appointed value analysis engineer.



F. D. Goll, appointed manager, pig and ingot sales, Aluminum Co. of America.

W. M. Webb, elected secretary, Alan Wood Steel Co.

Burroughs Corp.—**T. M. Butler, G. B. Holmes** and **B. W. Pollard,** appointed assistants to the vice president, manufacturing and engineering.

Frederic B. Stevens, Inc., Metal Finishing Div.—**R. A. Nyquist,** appointed sales engineer.

Mead-Morrison Div., McKiernan-Terry Corp.—**J. F. Rigler,** named sales engineer, mid-Atlantic States.

OBITUARIES

E. H. Conway, 55, sales manager, New York branch office, Whitehead Metals, Inc.

H. L. Brandt, executive vice president, Joseph Pollak Corp., Boston.

useful information on castings

DESIGN • PURCHASING • MACHINING

If you want more information about iron castings it's yours for the asking. Just check as many of these bulletins as you would like, clip this ad and mail it to us.

☐ Casting Design as Influenced by Foundry Practice
☐ Summary of Specifications for Gray and Nodular Cast Irons
☐ Hamilton Quality Ductile Iron
☐ Engineering and Purchasing Requirements for Gray Iron Castings
☐ Engineered Castings from Hamilton Foundry
☐ Handbook of Meehanite Metals
☐ Machining and Abrasive Finishing Gray and Nodular Iron
☐ Glossary of Terms—For Producers, Users of Iron Castings

Iron Castings have tremendous design flexibility—but there are certain danger points to be avoided. In addition, there is an engineered iron best suited to your combination of design and use requirements. You can get competent advice at any time from Hamilton Foundry engineers on these questions—and any other castings problem on your boards.

Name____________________Title____________
Company____________________________
Address____________________________
City__________________Zone_____State_______

GRAY IRON • ALLOYED IRON • MEEHANITE® • DUCTILE (NODULAR) IRON • NI-RESIST • DUCTILE NI-RESIST • NI-HARD

HAMILTON FOUNDRY INC.

1551 LINCOLN AVENUE • HAMILTON, OHIO • TWinbrook 5-7491

Both a

PROGRAMMER

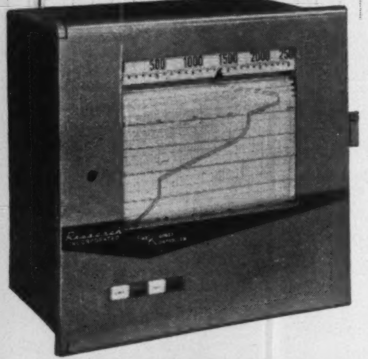
guided by a pencil-drawn curve

NO CAMS

and a

RECORDING CONTROLLER

which superimposes a record of actual process performance and applies corrective control when performance deviates from the plotted program

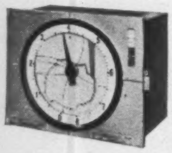


PREKORDER
TRADE-MARK

brings new flexibility to the automation of industrial process with closed-loop control.

1. **Pencil Programming** — No cams to cut.
2. **Superimposed Recording** — PreKorder's permanent record of process performance on a program chart overlay permits continuous visual comparison of record and chart.
3. **Programmed Limits** — To trigger alarm or shut-down circuits in case of process malfunction, just pencil allowable operating limits on the recording chart.
4. **Programmed Gain** — Varying the space between pencilled program lines varies the proportional control band or system gain.

Typical PreKorder applications are in programming temperature, pressure, power, load, flow, position, and other process variables. Both round and strip-chart models are available.



RESEARCH
INCORPORATED

Write Dept. IA, Box 6164, Minneapolis 24, Minn.

You Arbitrate It!

One for the Road

From the files of
The American Arbitration Association

▪ A company passenger car broke down one day about 120 miles from the plant, while an employee was delivering a small order of bearings to a customer. After the driver telephoned the superintendent, a new car was sent out to pick him up, complete the delivery and get the crippled car to a nearby garage. All this was done without further trouble, and the two men drove back to the shop.

The Right Driver?—A week later, the company learned that the repair job was finished and that the car could be picked up on payment of about $300. A foreman was sent out by train, with instructions to pay the bill and drive the car back if he found the work properly done. At this the union filed a grievance.

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the September 8 issue.

"Driving a company vehicle is bargaining unit work," the steward said. "If you want the foreman to go along to check the job, that's okay. But a member of the union has to do the driving. This is strictly a management operation."

Eventually, the case went to arbitration under the rules of the American Arbitration Association. How would you rule?

The Arbitrator Ruled:

He pointed out that if the foreman had found the repair job not properly done, he would have returned, as he went, by train. In that case, there would not have been any driving. The purpose of the trip was to determine whether the job should be accepted. The driving, he said, was "intimately tied in with the management responsibility" the foreman had been exercising, and as such was not in violation of the agreement.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

KEYSTONE WIRE

is used by Loose Leaf Metals Co. to produce high quality hardware for loose leaf books

Loose Leaf Metals Co. produces a wide range of quality products, including the rings shown here.

KEYSTONE FORMING WIRE STUDY

Manufacturers of loose leaf binders look to Loose Leaf Metals Co. for their hardware needs. And, in turn, Loose Leaf Metals looks to Keystone for forming wire that has all the necessary properties for quality manufacture of their rings.

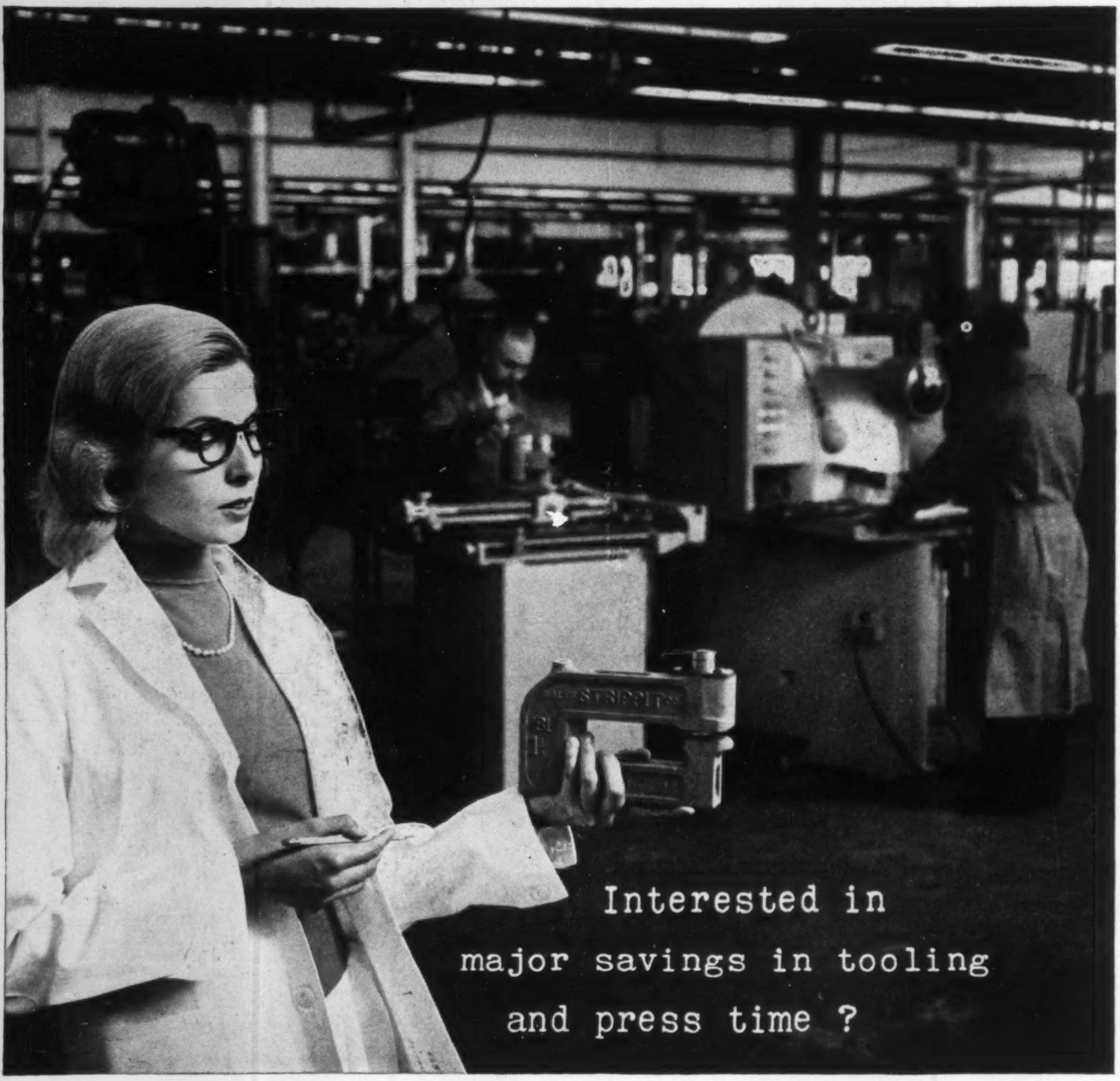
To manufacture quality, precision-made rings at low cost on a mass-production basis, Keystone specially-developed copper coated annealed-in-process Forming Wire is used. Its superior quality and constant uniformity result in a perfectly aligned and nickel-plated ring.

Keystone wire for Loose Leaf Metals Co.'s "Perfection" binder rings must have the correct temper so the wire can be rolled into oval shape prior to being formed into rings, then cut, swedged and deburred. In addition, the clean brite finish of Keystone Forming Wire provides a base for successful nickel plating.

The combination of Keystone experienced wire engineering, plus constantly improved marketing techniques of Loose Leaf Metals have resulted in greatly increased production of binder hardware at lower costs.

Perhaps Keystone Wire Specialists can solve your wire problems, too. Call your nearest Keystone representative, or write us for details. *Keystone Steel & Wire Company, Peoria, Illinois*

KEYSTONE
WIRE FOR INDUSTRY



Come to STRIPPIT - Booth 340 at Chicago's Navy Pier

You'll get a fresh slant on ways to work metal when you visit the Production Engineering Show in September. Stop by the STRIPPIT booth and see how our self-contained punching units eliminate expensive dies, how the Flex-O-Drill sharply reduces template making time, how our versatile Fabricators simplify pilot and production runs. SELF-CONTAINED HOLE PUNCHING UNITS reduce tooling to a simple assembly operation. Punches, stripping guides and die buttons are component parts of the unit. Nothing's attached to press ram. No die set required!

STRIPPIT FLEX-O-DRILL (left) speeds production of accurate templates and layouts. A table-top precision machine for drilling, reaming, center punching and scribing, Flex-O-Drill does away with need for base-line drawings or vernier height gauges. Handles ¼″ material up to 24″ wide and in any length. STRIPPIT MODEL 15A FABRICATOR (right), the latest model of one of industry's most versatile sheet metalworking machines, features the new Strippit Electro-Hydramatic Head for controlling the stroke. The time-saving Fabricator punches any sheet material up to ¼″ thick, notches and nibbles up to ⅛″ thick material.

If you can't make the show, be sure to write for the General Catalog explaining the STRIPPIT System.

A UNIT OF HOUDAILLE INDUSTRIES, INC.

WALES STRIPPIT INC.

202 Buell Road Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: E.H. Jones, (Machine Tools) Ltd., Hove, Sussex, England.

Survey Tool Users Buying Plans

By **E. C. Beaudet,** Managing Editor

■ Thousands of visitors to the Machine Tool Exposition in Chicago next month will have just one thing in mind: How to drive down production costs.

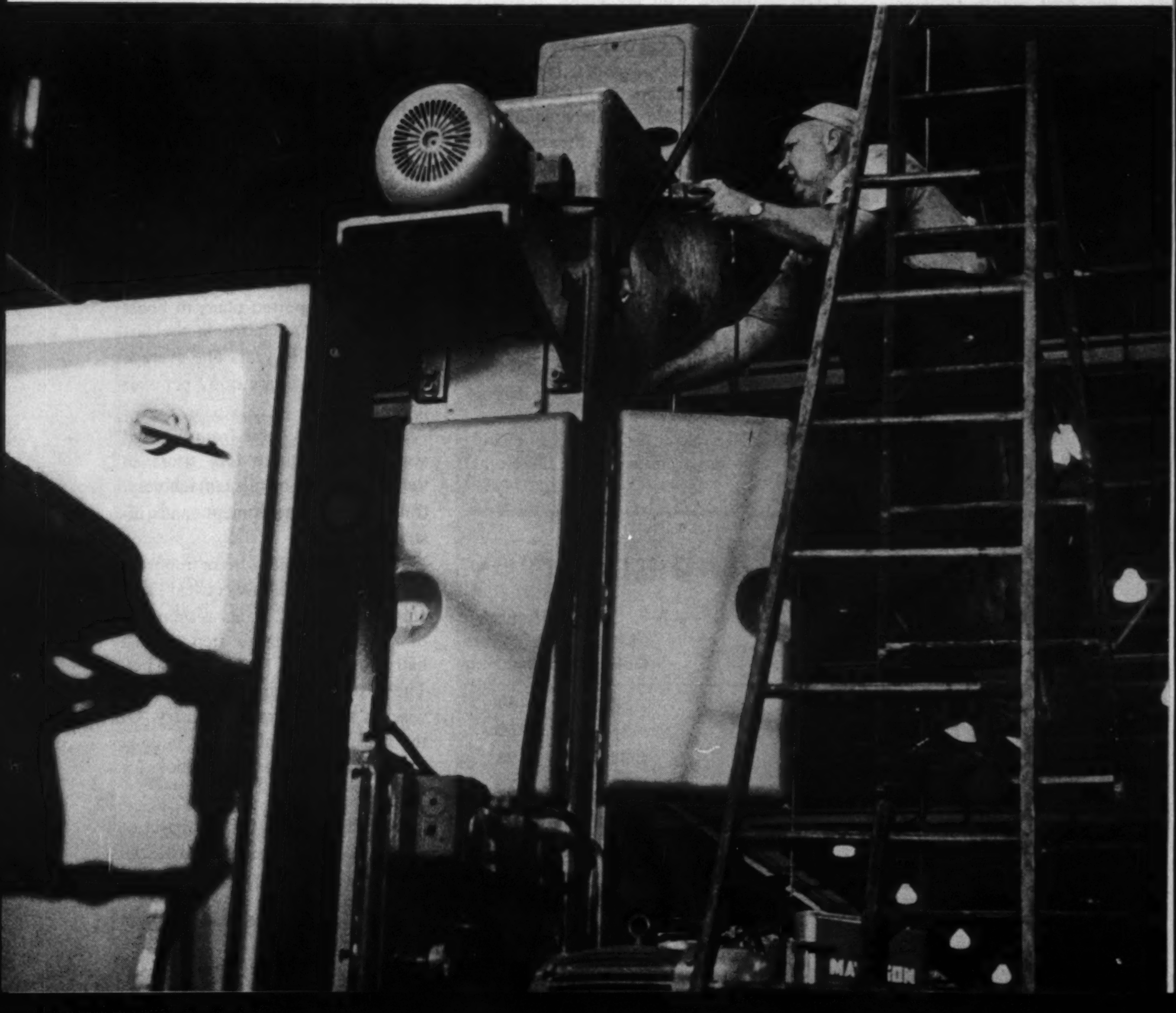
Strong Answers—Over 1000 of the very latest models of machine tools will be displayed against a backdrop of intense competition at home and abroad.

Companies exhibiting these machines will offer strong answers to questions of raising productivity and lowering costs.

Big Questions—But for the builders themselves, the big question is how many companies are in a position to buy their cost-cutting machines on display at the show.

To get some idea The IRON AGE surveyed machine tool users in five major metalworking industries.

Spending Plans — Their answers on the improvements they are looking forward to in Chicago, and what they plan to spend in the last half of this year, are reported in this survey.



Companies Plan to Buy More Tools in Second Half

Machine tool users reporting in this survey say they will raise buying sights an average of 32 pct in the last six months of 1960.

Here is a rundown of those plants which will do the buying and what they are looking for.

▪ More than 130 companies are laying close to $50 million on the line next month to convince their customers that the shortest route to higher profits is through the most efficient tools.

In so doing, builders exhibiting at the Machine Tool Exposition in Chicago hope to turn a decreasing sales trend into a new wave of equipment buying.

For the first six months of the year makers of metal-cutting tools saw orders run 9 pct ahead of first-half 1959. But net new orders have been dropping slowly since March. Metal-forming tools have done slightly better. By the end of June orders had topped first-half 1959 by 15 pct. The six-month peak was hit in April. By May net new orders started tailing off.

Years of Progress—The 1050 different models of the latest machine tool designs on display at the International Amphitheatre stand every chance of reversing the trend.

In the five years since the last machine tool show, more progress has been made in machine tool design than in the previous twenty. Numerical controls have come into their own. And from advance reports they are expected to steal the spotlight in Chicago.

Along with the major strides in the application of numerical controls, have come a host of other technological advances. Not as eye catching perhaps as numerical controls, they are certainly equally as important in filling the desire of tool users to drive production costs down.

Worth Waiting For— Big gains have been made in the design of multi-operation machines, part handling devices and new processes for removing metal. Accuracy, too, has been stepped up. Machines capable of holding tolerances to millionths of an inch are now commonplace.

The most far-reaching change visitors will notice is the large-scale shift from operator to automatic control. This is basic to almost all new tool designs. It means output and accuracy are less dependent on operator skill and experience. To the user it means higher productivity and lower costs.

These are the main advances with which machine tool builders hope to whet the appetites of their customers. For those buyers who have been holding back to see them in Chicago, they will have been worth waiting for. And those visitors who have thought their companies could not afford new tools may find they can't afford to do without them.

Buyers Ready — Only in the months following the Machine Tool Exposition will the toolmakers find out how successful they have been. But an IRON AGE survey of machine tool users shows they are seemingly in a buying mood.

Of 662 plants taking part in the survey, 564 reported plans to boost machine tool purchases in the last six months of this year. The average called for an increase of 32 pct over first-half 1960.

These replies come from a broad section of machine tool users in the fabricated metals, machinery, transportation equipment and instrument fields.

The biggest plans were reported by makers of non-electrical machinery. The 268 plants responding in this group plan to step up last half machine tool buying by 34 pct. The next highest group, percentagewise, is the instrument industry. Of the five groups, only plants making fabricated metal products look for a dropoff of 9 pct.

Who Will Buy—On the basis of plant size rather than industry, the most ambitious buying plans were

Tool Users Reporting in Survey

Breakdown By Industry	SIC Code	Number Of Plants Reporting
Fabricated Metal Products	34	163
Machinery (ex. Electrical)	35	300
Electrical Machinery & Equip.	36	96
Transportation Equipment	37	70
Instruments	38	33
Total		**662**

Spending Plans by Industry, Plant Size

Question: **What will your machine tool purchases for this plant amount to in:**
1st 6 mos. 1960 $......... Approx. Full Year 1960 $......... Approx.

Answer:

Breakdown By Industry	Number of Plants Reporting	Purchases 1st 6 mos. 1960	Purchases Full Year 1960	2nd Half '60 over 1st Half '60
(SIC)		($ Millions)	($ Millions)	(Pct)
34	110	$ 3.1	$ 5.9	−9 Pct
35	268	19.6	45.8	+34 Pct
36	83	2.6	7.7	+9 Pct
37	70	6.6	14.7	+24 Pct
38	33	1.8	4.0	+28 Pct
Total	564	$33.7 ($ Millions)	$78.1 ($ Millions)	+32 Pct

Answer:

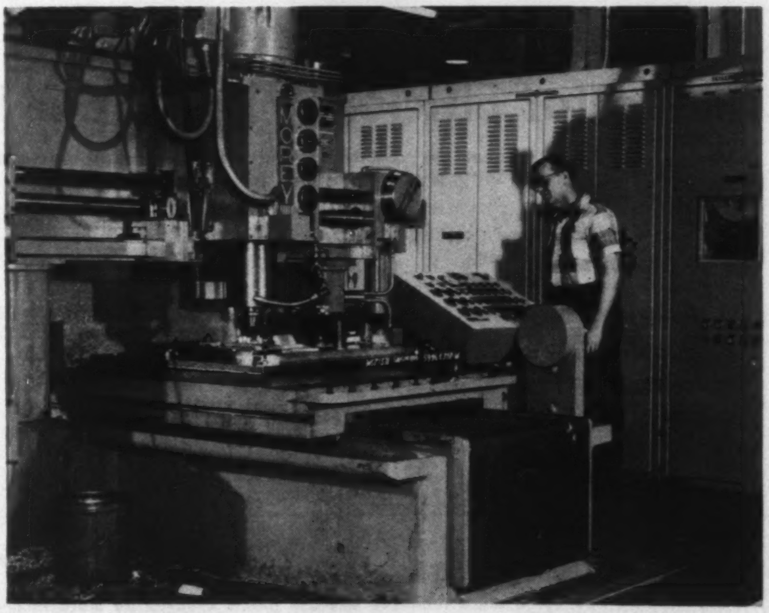
Breakdown By Plant Size	Number of Plants Reporting	Purchases 1st 6 mos. 1960	Purchases Full Year 1960	2nd Half '60 over 1st Half '60
(No. of Workers)		($ Millions)	($ Millions)	(Pct)
over 2500	15	$ 3.5	$11.8	+140 Pct
1000-2499	59	8.8	20.1	+28 Pct
500-999	81	9.7	20.4	+11 Pct
250-499	99	5.1	9.5	−15 Pct
100-249	310	6.6	16.4	+47 Pct
Total	564	$33.7 ($ Millions)	$78.1 ($ Millions)	+32 Pct

reported by those groups employing the largest and the smallest number of production workers.

Plants with 2500 or more production workers foresaw a 140 pct gain in the placing of new tool orders. Those in the 100-249 production employee category expect to spend 47 pct more in the last half.

Beside dollar amounts, The IRON AGE thought it might be helpful to find out what kinds of tools most buyers were interested in purchasing. So, users were asked to break down their planned purchases into dollars to be spent for standard versus special tools; and production versus tool room equipment.

What They'll Buy—Of all groups reporting, 67 pct were slating last-half new machine tool dollars for standard machines as against 33 pct for special types. Production tools,



BIG CHANGE: Tape controls typify shift to automatic control.

naturally, gained the nod over tool room equipment 78 pct to 22 pct.

As might be expected, the largest dollar amounts for special machine tools were reported by plants employing over 2500 production workers. In these plants, special machine tools took 52 pct of planned purchases. And in the same plants production equipment showed a 94 pct dollar advantage over tool room machines.

Another side of the picture is shown by plants in the 100-249 worker group. Here, standard machines are expected to account for 74 pct of expected dollar purchases in the last half and production equipment some 72 pct.

Combating Imports — In putting their best foot forward in Chicago next month, machine tool builders hope to stave off higher machine tool imports and to recapture declining markets overseas.

Special machines, and those of advanced design, are not too easy to come by from foreign sources. But in the area of standard tools, lower wages and production costs give foreign tool builders a competitive edge.

Through April, machine tool imports came to about $13.5 million dollars. Since they sell at about one-

Users to Buy Standard Tools

Question: **Roughly, how will 1960 dollar purchases be divided among different machine tools?**

Answer:

Breakdown By Industry	Number of Plants Reporting	Standard vs Special		Production vs Tool Room	
(SIC)		(Pct)		(Pct)	
34	108	45 Pct	55 Pct	75 Pct	25 Pct
35	252	71	29	74	26
36	79	51	49	79	21
37	67	68	32	67	11
38	32	81	19	32	23
Total	538	67 Pct	33 Pct	78 Pct	22 Pct

Based on dollar amounts of number of plants reporting.

Answer:

Breakdown By Plant Size	Number of Plants Reporting	Standard vs Special		Production vs Tool Room	
(No. of Workers)		(Pct)		(Pct)	
over 2500	13	48 Pct	52 Pct	94 Pct	6 Pct
1000-2499	54	65	35	80	20
500-999	80	76	24	67	33
250-499	90	66	34	84	16
100-249	301	74	26	72	28
Total	538	67 Pct	33 Pct	78 Pct	22 Pct

Based on dollar amounts of number of plants reporting.

Need for Efficiency Will Spur Buying

Question: **What factor do you think will stimulate machine tool purchases the most?**

Answer:

Breakdown By Plant Size	Number of Plants Reporting	Greater Efficiency	More Business	Obsolescence	Liberalized Depreciation	Easier Financing
(No. of Workers)						
over 2500	13	13	13	12	8	4
1000-2499	54	54	51	43	33	28
500-999	68	68	66	56	47	37
250-499	102	101	91	85	66	46
100-249	272	268	259	200	145	109
Total	509	504	480	396	299	224
Total, Pct*	100 Pct	99 Pct	94 Pct	78 Pct	59 Pct	44 Pct

*** Percentages add up to more than 100 because plants checked off more than one answer.**

Most Users Prefer U.S. Makes

Question: **Are you considering new purchases of foreign machine tools?**

Answer:

Breakdown By Plant Size	Number Of Plants Reporting	YES	NO
(No. of Workers)			
Over 2500	16	8	8
1000—2499	60	15	45
500—999	79	35	44
250—499	115	22	93
100—249	349	68	289
Total	619	148	471
Total, Pct	100 Pct	24 Pct	76 Pct

Question: **If yes, why?**

Answer:

Breakdown By Plant Size	Number Of Plants Reporting	Price	Quality	Special Purpose Tools	Delivery
(No. of Workers)					
Over 2500	8	4	1	4	—
1000—2499	15	9	4	9	2
500—999	35	28	14	11	3
250—499	22	14	8	9	2
100—249	68	54	31	20	6
Total	148	109	58	53	13
Total, Pct*	100 Pct	74 Pct	39 Pct	36 Pct	9 Pct

*Percentages add up to more than 100 because plants checked off more than one answer.

third less than similar machines produced here, this equipment represents about $18 million dollars worth of American-made tools. On this adjusted basis, imports for the year are estimated at $54 million.

Germany Takes Lead—Not too long ago, West Germany surpassed the United States as the world's leading machine tool producer. In 1958 the country turned out $431 million worth of machine tools compared to $520 million for the United States. But because of lower costs, when the W. German dollar figures are adjusted to their corresponding value in this country they come to $645 million. On a per capita basis, the W. Germans outproduced American tool builders four to one.

Another reason for the upsurge of machine tool productive strength in W. Europe has been the growing industrial comeback in the area. Plant modernization has been spurred by very liberal depreciation allowances in all W. European countries. In America, meanwhile, plant obsolescence has been growing partly because of the lack of adequate depreciation laws.

Why Users Buy Imports — It's against this competitive background that tool builders are putting forth their best in research and development at the Machine Tool Exposition in Chicago.

Just how much competition they are up against was the basis for another question asked machine tool users in The IRON AGE survey. The question: How many were considering the purchase of foreign machine tools, and if so, why?

Twenty-four per cent of the 619 plants answering this question said they were considering foreign tool purchases. Of these 148 plants, an overwhelming 74 pct of all reasons offered was price.

Lagging far behind this reason were quality, special purpose tools and delivery with 39, 36 and 9 pct of all votes cast for the choices listed. Interestingly enough, the percentage of plants considering foreign sources grew as they went up in size. But price was given more times as the reason as the reporting plants became smaller.

Efficiency Scores — The next question was aimed at getting some idea of what factors would most make tool users go ahead with their planned purchases.

The choices offered for answering this question included: More efficient equipment; a higher volume of business; growing plant obsolescence; liberalized depreciation laws; and easier financing arrangements.

Almost all of the 509 plants replying, 99 pct in fact, chose greater efficiency as a factor in spurring new order placements. Close behind this came more business with 94 pct of all votes cast.

From this high point on, the next level was obsolescence with 78 pct of all the reasons in its favor. More liberal depreciation laws scored easily over easier financing arrangements, 59 pct to 44 pct.

Regardless of plant size, all tool users listed the reasons for buying new tools in the same order of preference.

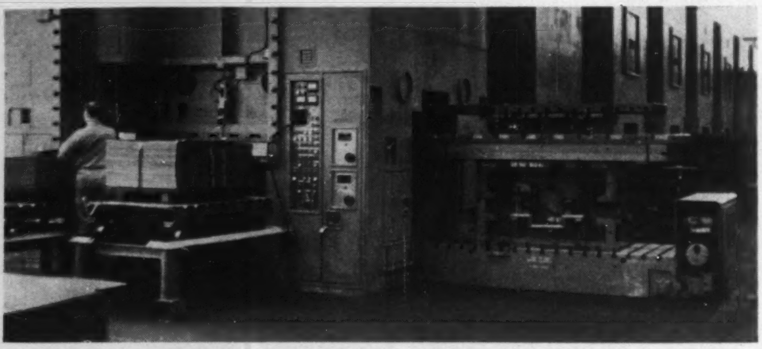
Most Wanted Features—Finally, and probably most important from the builders viewpoint, The IRON AGE asked users what improve-

Press Users Need Business

Question: What factors do you think will stimulate press purchases the most?

Answer:

Breakdown By Plant Size	Number of Plants Reporting	More Business	Higher Efficiency	Liberalized Depreciation	Easier Financing
(No. of Workers)					
over 2500	11	11	7	7	6
1000-2499	18	6	13	9	5
500-999	35	28	29	11	12
250-499	77	65	48	89	21
100-249	210	176	150	91	70
Total	315	286	247	207	114
Total, Pct	100 Pct	82 Pct	70 Pct	59 Pct	32 Pct



PRESS PROGRESS: Sliding bolster presses are gaining new uses.

ments they were looking for most in buying new machine tools.

To help answer the question, respondents were given a choice of six: More versatility; faster part handling; higher cutting speeds; easier maintenance; automatic controls; and longer service life.

All of the choices listed by all of the plants were pretty closely bunched together. Versatility picked up the greatest number of votes with 85 pct of all those cast. At the bottom end of the range longer service life accounted for 62 pct of the total.

In the smallest, 100-249 worker group, versatility far out-weighed all other considerations in the minds of those buyers seeking areas of machine tool improvement. In the larger plants, however, faster part handling and automatic controls carried about equal weight with versatility in the voting.

Press Users—While replies from plants using presses weren't as comprehensive or as many in number as those from machine tool users, they contained many interesting comments.

Their answers show up in the tables on these pages and in the comments following this article.

Seek Faster Die Changes

Question: What improvements are you looking for most in buying a new press?

Answers:

Breakdown By Plant Size	Number of Plants Reporting	Faster Die Changes	Faster Speeds	Better Part Handling	More Capacity
(No. of Workers)					
over 2500	11	10	8	9	7
1000-2499	15	11	13	14	12
500-999	35	26	29	22	21
250-499	75	57	54	52	48
100-249	208	162	136	134	119
Total	344	266	240	231	207
Total, Pct*	100 Pct	77 Pct	70 Pct	67 Pct	60 Pct

* Percentages add up to more than 100 because plants checked off more than one answer.

What Users Want Most in New Tools

Question: **What improvements are you looking for most in buying a new machine tool?**

Answer:

Breakdown By Plant Size	Number of Plants Reporting	More Versatility	Faster Part Handling	Higher Cutting Speeds	Easier Maintenance	Automatic Controls	Longer Service Life
(No. of Workers)							
over 2500	13	11	13	10	12	13	8
1000-2499	52	47	44	46	39	44	35
500-999	75	62	66	63	53	51	48
250-499	104	86	84	92	79	88	72
100-249	280	240	215	202	193	167	164
Total	524	446	422	413	376	363	327
Total, Pct*	100 Pct	85 Pct	81 Pct	79 Pct	72 Pct	69 Pct	62 Pct

* Percentages add up to more than 100 because plants checked off more than one answer.

Comments on Tools and Presses

Question: Are there any other areas of machine tool and press design you think can stand improvement?

In addition to the choices listed in the table on p. 186, The IRON AGE asked machine tool and press users to comment on areas of design they thought could be improved. Undoubtedly, many of their replies will be answered at the Machine Tool Exposition. Representative comments are given below:

Inspection

"A machine tool should be designed to do its own inspection by rejecting bad parts with a signal system indicating the point of trouble. The operator's duty should be to load, start and stop the machine. Setup men, tool designers and servicemen should have the real responsibility." L. V. Patti, Vice President, **Western Machinery Co.**

Simplicity

"We are always watching for new developments which will increase our production and enable us to remain competitive. However, improvementments must not complicate machining operations with gadgets which are difficult to maintain." L. D. Harmony, President, **Stamco, Inc.**

Automatic Feeds

"More work should be done to incorporate automatic feeding and ejection on standard machines. This is mostly left to the purchaser." H. H. Sherman, Vice President, **Wall Mfg. Supply Co.**

Accuracy

"In my opinion, there are not enough relatively 'inexpensive' machines which can hold required tolerances or have the versatility they should have without making tolerance suffer. This is one area American machine tool builders should concentrate on to eliminate foreign competition." R. C. Geiger, Manufacturing Engineering Manager, **Maryland Div., Litton Industries.**

Tape Controls

"Wider application of simplified numerical control is needed on general purpose machine tools for job shop production to improve quality and reduce labor costs." F. S. Mott, Works Manager, **The Elliot Co.**

Maintenance

"We have found and come to expect more downtime on our newer and more complex equipment. Ease of repair and service are great factors in our purchase decisions." R. Hurley, Assistant Superintendent, **Grant Gear Works.**

Partial Automation

"There are no machines made with semi-automatic controls. They are either standard models or tape-controlled. Small- and medium-sized users have trouble developing partly automated equipment." F. Connard, Secretary, **Hale Fire Pump Co.**

Standardization

"Standardized specifications for easier interchangeability of major components in different makes of standard machine tools—to give greater flexibility and efficiency." H. H. Beaudet, Manager of Industrial Engineering, **Draper Corp.**

Tool Setting

"Faster tool setting and changing are overlooked almost entirely. They are some of our highest costs." J. Kosinski, Works Manager, **Scully Jones Co.**

Safety

"Better safeguarding devices, greater use of antifriction bearings, better lubrication systems and more consideration of noise factors." N. J. Edinger, Plant Engineer, **Raymond Mfg. Co.**

Installation

"A more complete shakedown in the machine tool manufacturer's plant to avoid complications arising after installation in the user's plant. This is especially true for machines of new design or machines incorporating new features." D. G. Tucker, Staff Engineer, **Nordberg Mfg. Co.**

Small Lots

"Most machines need easier methods of changing feeds and speeds for easier use in a small-lot job shop. Also, it would help if they were designed to change setups rapidly." F. Fisher, Manufacturing Manager, **Thompson Products, Inc.**

Die Changes

"For a job or contract shop, because of many die changes, faster die setups are required. It may be possible to design better and faster die-mounting facilities." H. A. Holberson, Vice President, **Youngstown Metal Products Co.**

Overload Protection

"Hydraulic presses—greater reliability of larger pumps, over 100 tons. Better performance of packing glands. Mechanical presses—more foolproof overload protection." J. L. Graham, Plant Engineer, **Pressed Steel Tank Co.**

Ram Speeds

"Clutches and brakes are basic problem areas. A simple, reliable device to prevent press overloads would be desirable. Also, multiple speed rams to permit more strokes per minute while retaining a drawing speed of 50-60 ft per min." P. C. Wood, Works Manager, **Acklin Stamping Div.**

Lubrication

"Automatic lubrication is becoming more of a necessity with higher speeds and unskilled help operating and maintaining press equipment." A. J. Schpatz, Manufacturing Engineer, **Continental Can Co.**

Position

"Placement of controls at a more convenient position." R. J. Lauremy, Superintendent, **Marchant Calculators.**

Bolster Plates

"Changing bolster plates and assembly of pressure pads (hydraulic, air cylinder, rubber cushion, etc.) are very time consuming for shops that are a large percentage of short-run jobs. This is especially true for presses approaching 100 tons or over." E. S. Van Arnam, **Ward Leonard Electric Co.**

Dead Center

"Devices to prevent presses from getting stuck on bottom dead center during set up." G. L. Broack, Chief Ind. Engineer, **Electric Auto Lite Co.**

Safety Factor

"I believe there should be a greater safety factor on the overloading of presses. We had trouble with a 200-ton press when the crank cracked because of a slight overloading." J. A. Hanover, Vice President, **Jas. P. Marsh Corp.**

Tie In Feeds

"Feeds on automatic presses should be tied-in electrically so that the press brake would be applied in case of a stock bundle or jam." A. C. Stocker, Vice President—Manufacturing, **Stevens Mfg. Co.**

Pressure

"Need small hydraulic presses which can exert pressures from different angles simultaneously." R. C. Hannegan, Vice President, **Gibson Electric Co.**

Uniformity

"Clutches are frequently a problem. Also, feel there should be a more uniform method of rating capacity among competitive presses." H. J. Hill, Vice President, **H. C. Weiskittle Co.**

Faster Handling

"Faster parts handling. Speeds, feeds and controls are being improved constantly. On longer parts that are too heavy to handle by hand, the in-and-out time on machine tools amounts to a good percent of the total machining time. I have in mind parts in the 50 lb class that must be handled by air. Also, on production machines all chucks should be standard equipment." P. J. Renwald, Plant Superintendent, **Fairbanks Morse Co.**

Rugged Design

"As a general comment, we would like to see more ruggedness in the construction of new machine tools." C. E. Bain, Vice President and Works Manager, **American Pulley Co.**

Programming

"Basic design of machine tools should include the ability to add electronic control and programming devices at lower cost." A. Schraeder, Director of Purchases, **Cardwell Manufacturing Co.**

YOU CAN USE A LARGER SHAFT WHEN YOUR "SPECS" READ HYATT

Need a larger shaft without disturbing envelope dimensions? Take advantage of a Hyatt option by omitting the inner race. You can add the thickness of the Hyatt inner race to the shaft and let the rollers operate directly on shaft. Just be sure that the shaft is suitably hardened and ground. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

Replacement bearings available through United Motors System and its authorized bearing distributors.

HYATT ***HY-ROLL BEARINGS***

IN ROLLER BEARINGS HYATT IS THE WORD FOR GM GENERAL MOTORS RELIABILITY

SLABS, BLOOMS

BLISS
BLISS

Hot ingot heads into first pass through new Bliss mill.

AND ROUNDS ON THIS VERSATILE MILL

Quick handling of 7½-ton ingots another dividend

"Big investment, big dividends" sums up the new automated blooming mill illustrated at left. Key component of a new $14 million steel plant, it was built and designed by Bliss' Rolling Mill Division to enable its owner, a prominent manufacturer of heavy equipment, to meet mounting orders for seamless tubing and welding fittings.

Here is automation at its smoothest. With only a handful of men in efficient control pulpits, the plant can turn out blooms of many shapes and sizes; can handle ingots as heavy as 7½ tons!

Heart of the operation is a new, 40″ x 90″ high-lift blooming mill, whose rolls are automatically set for each pass by punched cards. Taking the ingots poured by the new 100-ton electric furnace, it rolls them into the size required.

Of special interest is the mill's unusually versatile design. Thanks to it, the plant is able to handle round shapes as well as blooms and slabs, simply by changing the rolls. The latter were supplied by Bliss' Mackintosh - Hemphill Division.

According to the plant superintendent, this new plant has increased the company's melting and rolling capacity a full 50%. And based on its proven operating performance, the new Bliss mill will be ready to take any additional new load in stride.

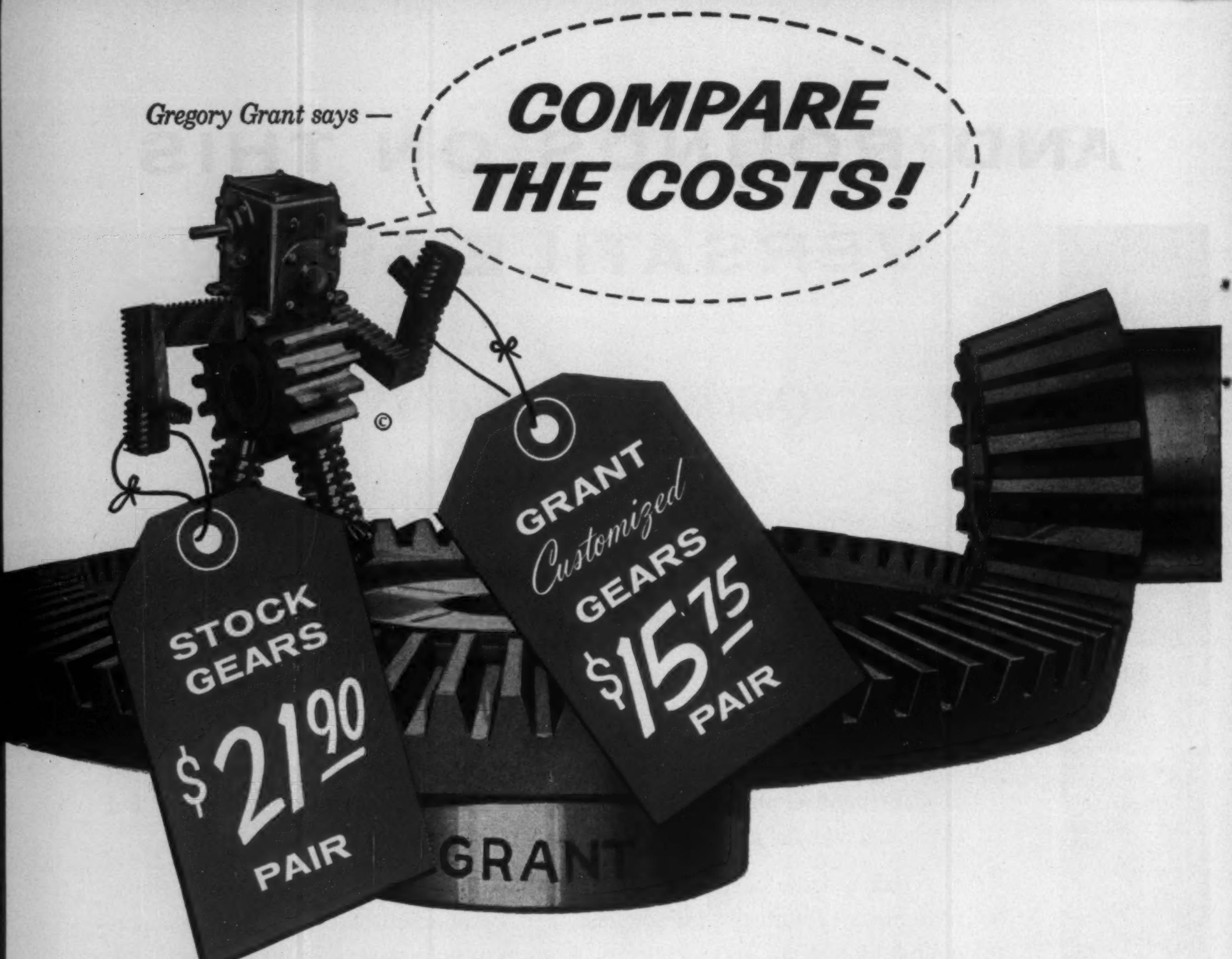
Whether your plans call for a big outlay or a modest one, it will pay you to discuss them with Bliss. To learn how other firms have . . . and have profited . . . write for our 84-page Rolling Mill Brochure, Bulletin 40-B.

BLISS
SINCE 1857

Bliss is more than a name . . . it's a guarantee

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

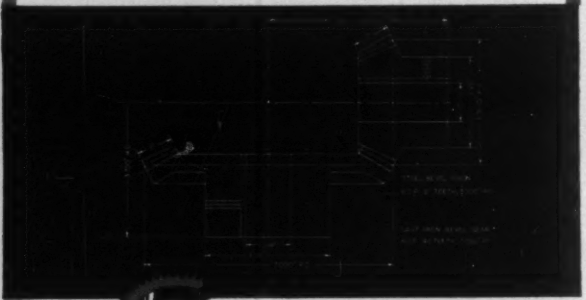
Rolling Mills • Mill Auxiliaries • Amerigear / Bliss Spindles
Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio


Gregory Grant says —
COMPARE THE COSTS!
STOCK GEARS
$21.90
PAIR
GRANT
Customized
GEARS
$15.75
PAIR
GRANT

MAKE YOUR OWN COMPARISON . . .
CALL ANDREW 8-4409 COLLECT

Here is a typical comparison — 50 sets of gears and pinions to meet assembly specifications:

Set of stock gears unaltered	$20.20	Set of Grant customized gears to your specifications, ready for installation
Rebore shaft hole/per pr.	.80	
Cut keyway/per pr.	.50	
Drill and tap for set screw/per pr.	.40	
	$21.90 pair	$15.75 pair



We believe we can prove on your next O.E.M. application that you can save 25% in actual costs when you specify Grant *customized* gears, instead of making time-consuming alterations to stock gears to fit your needs.

So call us — collect — we will gladly quote on your needs, no obligation, of course.

CALL COLLECT — THE NUMBER IS ANDREW 8-4409 FOR THE BEST IN CUSTOMIZED GEARS.

ESTABLISHED
IN 1877

GRANT GEAR WORKS, INC. WEST SECOND STREET, BOSTON 27, MASS.

• Catalog Available on Customized Gears • Precision Gears • Speed Reducers

Machine Tool Exposition Feature

Machine Tools 1960

New Tools for New Problems

Growing markets, new materials, space age demands and driving world competition have moved machine tool design swiftly ahead in the past five years.

How far and how fast can be seen in detail at the Machine Tool Exposition in Chicago next month. Here are some of the highlights.

By R. H. Eshelman, Machinery Editor

Drilling and Boring

Numerical controls make big gains . . . Dial-in control serves middle ground . . . Better tooling

▪ Since the Machine Tool Exposition of 1955, a parade of spectacular and far-reaching developments has accelerated an era of change in metalcutting. Nowhere has progress been more evident than in drilling and boring.

Biggest spectacular of the metalworking world in this period is the phenomenal rise of numerical control. And in a star-studded cast, drilling and boring claim some outstanding performers.

Drilling With Tape—The turret drill with numerical control is flourishing in new production fields. Standard machines provide automation with flexibility for a wider range of work: drilling, reaming, tapping —even boring. Utility extends from prototype small lots to mass production.

Economies of numerical control on such machines are truly incredible. And both job shops and large plants are claiming these cost savings. Those that do, gain the competitive edge. Reports one large manufacturer, "Forty percent of our production is subcontracted, with preference given first to the small, automated shop."

Another large plant advises, "Within five years, 35 percent of all our operations will be numerically controlled because of the tremendous savings in tool costs, lead time, improved accuracy and increased production."

In a test on five piece-parts, this plant was in production within 40 hours on tape-controlled turret drilling operations. For comparison by conventional methods this is a 256 hour job.

Modular Design Gains—Representative of the building-block concept—now invading the standard machine field—is the design of a drill press with a wide range of accessory modules. These allow you to mechanize virtually all aspects of the job, including loading and unloading. That's tailored automation! And without the cost of special engineering.

In drilling, the tool is often taken for granted. But research has come up with a more scientific view. The result is a spiral point. This gives more positive hole location, faster and more accurate drilling, too.

Machines Do More—With the higher degree of sophistication of tape control, the jig borer is another machine that can do more. This type machine now becomes a versatile metalcutting shop. Numerical control systems permit combining of operations, thus eliminating extra handling of parts. It's especially well suited for production lots of repetitive work.

With complete programming of the machine, operator fatigue is reduced—and much of the human error. Also, now industry has at hand a predictable cycle time for machining parts in small production quantities.

Advances in N-C are flowing in a continuous stream. In heavy radial drilling and jig boring, there is already three axis (depth control) as well as more common two axis or point-to-point control. The next step, expected to be demonstrated at Chicago, is the automatic tool changer to complete the full automatic cycle in this field.

Another important development is an intermediate control system using dial-in control. This serves the middle ground between purely manual machines and the highly automatic tape control.

Popular success of this approach shows there must be many jobs and plants that cannot justify cost of the numerical control now, but need simplified measuring and positioning systems.

Many Improvements—With emphasis focused on electrical control, basic machine improvements should not be overlooked. Required was major mechanical redesign. Machines had to be substantially stiffened. A greater control of the varable parameters of the mechanical structure was needed.

This, too, represents a major advance in thinking. That is, the machine and its control represent a system. Neither machine nor control can be treated separately.

Basic Trends—In fact, since the end of World War II dual trends appear dominant in metalworking. One is toward greater productivity and more automatic operation. The other is for greater precision and reliability.

Spur to the first are production demands of the vast auto industry. The second may be in response to needs of defense: higher-speed aircraft, missiles and space projects. But resulting improvements are spilling over into all industry: better, faster and more accurate cutting machine tools.

So this continuing search for increased accuracy and productivity has wrought many noteworthy design improvements. Boring machines are typical. They are now available with thermal control of the main spindle bearings. This eliminates spindle growth due to heat. It substantially increases accuracy.

Sturdier Machines — Too, new machines have wider and heavier beds, saddles and tables for greater rigidity and accuracy. Thus industry has heavier cuts at higher speeds and feeds without loss of accuracy.

Today's machines have improved and simplified controls. This means higher operating efficiency. Hand shift levers manual clamp levers and adjustments in positioning cutting tools are giving way to push-button operation.

Sliding friction has been of great concern in the past. But new materials and designs have largely solved these problems. Non-metallic way inserts and fluid pressurized ways are one answer.

Look for other innovations at the Chicago Exposition. Stainless steel is being used, for instance, to cover bedways. Result is less wear of main slides, reduced maintenance costs.

Boost Uptime—Booming of tape control and electronics has posed some problems in maintenance. Machine designers now see the way out of these woods. That is the move towards standardization, simplification and packaged components. Already transistorized, modular control consoles have appeared on the industrial scene. Plug-in packages, with only a few types, means minimum downtime, ready servicing.

Another advance in direction of practical shop operation is streamlining of programming for numerically-controlled processes. One such method is a design with tape-controlled functions of the machine interlocked electrically. Programming, then, of the actual machining operations on the part, is held down. Automatic functions of the machine take place in predetermined sequences. These do not have to be programmed into the tape. This means simplicity. It is possible to program tapes in much shorter time than previously. In fact, the ratio of programming time to actual machining time on such boring mills is quite low.

Better Tooling—Again, of particular interest at this time—with the advent of numerically - controlled machines, is proper sharpening and presetting of cutting tools. With improved cutting tools, carbides and ceramics feeds and speeds are moving up. Exotic metals also accentuate tooling problems.

Related studies are throwing added light on tool point geometry and cutting concepts. For example, in boring, preset tooling systems now permit setting tools to accurate dimensions off the machine. Cut and tried methods are rapidly going by the board.

Turning

Design advances cut vibration . . . Tracer accuracy improves . . . "brains" direct contouring.

▪ Perhaps the most important trend in turning has been the move towards more automatic operation. This is reflected in components, controls, accessories and tooling: mechanical, hydraulic pneumatic and, most recently, electronic.

While this trend to the automatic is hardly new, nor confined to turning, the class of machines that falls under the general heading of lathes poses some unique problems for mechanization. Probably that is one reason why turning equipment takes so many forms: automatic bar units and chuckers—single and multiple spindle types—engine lathes, tracing lathes, horizontal and vertical turret lathes, and so on.

Basic Machine Better — Engine lathes since 1955 have undergone a rapid technological advance. Improvements can be classed under three general trends: those to improve rate and quality of production; those to make them more convenient and easy to operate and third, sophistication in design.

Increased productivity has come about by stronger design. Strength is built-in to withstand higher stresses of a boost in horsepower. Then too, spindle speeds and the number of speeds have been increased to allow for the use of carbide tooling. And there are more feed and thread ranges available, also.

Stronger construction, greater precision in manufacture, use of improved components have reduced vibration and bettered accuracy. Downtime for maintenance is dropping due to use of anti-friction bearings and pressurized lubrication. Hardened and ground bedways are virtually standard.

Less Operator Effort — Design, focused on more operator convenience, means a drop in part floor-to-floor time; less operator fatigue. Specific improvements include hydraulic operation of the headstock, high speed lathes and complete pushbutton control of the spindle.

Improvements in engineering sophistication represent an important

area of development. An example is a coaxial type headstock design to reduce vibration, boost efficiency and ease maintenance problems. This design has other plus marks. It permits advanced engineering features to be packaged in a very compact headstock. Another development is an infinitely variable speed drive, giving constant horsepower throughout full speed range and developing high torque at the lower speeds.

Tracing Gains—Tracer attachments for lathes, too, have undergone steady improvement. Advanced types now are usable for duplication of odd shapes as well as conventional turning. Some can produce contours on work held in a chuck or attached to a face plate.

On a six-spindle automatic screw machine there are installations with as many as five tracer attachments. Another development is multiple tooling on a two-dimensional turret lathe tracing unit.

In addition to following more intricate contours, there has been an upgrading in accuracy. Tracers that reproduced work within thousandths were once thought of as very accurate. Now they will duplicate the form to a tenth of a thousandth.

Primary objective of tracing is the transfer of skill from operator to machine; relatively unskilled workers can produce intricate parts to close tolerances. While the equipment replaces much of operator dexterity, they still leave much to human discretion and skills.

How Tape Helps — With tape control, feeds and speeds can be set by production engineers or methods for maximum efficiency. Advantages of tape control may even extend back to parts design. So, the determined effort to apply numerical control to virtually all the various types of turning equipment.

Point-to-point positioning is used for straight turning, or shaft work that involves various diameters successively. This type control may also cover spindle speeds, longitudinal feeds, changing cutting tools, etc.

Contouring or continuous path control, of course, is more expensive but turns different contours and intricate shapes. This system generally controls spindle speeds, rates of cross feed and longitudinal feeds.

Turret Lathes, Too—An intriguing development, recently announced, is a rather unusual combination of electronic - memory tracer and point-to-point tape control. The machine is a basic redesign of the classic turret lathe. The tape handles rectilinear cuts, but lets the electronic "brain" direct contouring. For setup, the operator first turns one contour, punches a button to impress this pattern on the brain.

This preoccupation with controls has a strictly utilitarian goal: reduction of idle time. Even on manual machines, such as conventional turret lathes, there is a real drive in this direction. Such techniques cover virtually instantaneous speed and feed selection and change, preset tooling, disposable cutter tips.

Large Machines Simplified—Even in larger machines, vertical turret lathes, this trend to simplified control is evident. Pendant type controls with pushbutton operation are examples. Single lever power control is another. This positions cutting heads, engages tool in the work, etc. These developments are aimed too, at non-productive time in the operating cycle. And inexperienced personnel can handle such equipment with short training.

In larger-size conventional lathes, a recent development is a design using modular units and welded steel construction. This concept resulted in some departures from conventional configuration. But performance, weight and economy are said to be attractive.

Single point threading, or thread chasing, has boomed. You find it both as an attachment on standard machines and as machines designed specifically for threading. Increased use of single point threading is undoubtedly due to need for accuracy of concentricity of threads for aircraft, missile and allied fields. One development here is an automatic threader, which provides completely automatic cycling.

Milling

New controls make "impossible" contours easily . . . Improved tracers and rigidity on new millers ..

■ Big news in milling is the advance of control sophistication. Milling technology probably has been the greatest beneficiary of the adoption of the computer—popularly the "electronic brain"—by manufacturing. Significantly, the MIT pioneering effort in tape control employed milling.

In the span of five years remarkable strides have been made in putting numerically controlled machines into the shop. Why? Tape controlled machines have given design engineers the necessary tool to lift design concepts to new levels of part accuracy. And now many contours that were virtually impossible to manufacture economically have become commonplace. New industries—aerospace, atomics, radar, electronics, and defense production generally—can give a big bow in direction of numerical control for their successes.

Versatility Grows—It's apparent now that the electronic brain has ushered in a new era of manufacturing. One of the most talked about machines of the period, although in essence a standard miller, introduced a radical new idea in production. That is a virtual self-contained metalworking plant—the classic concept of the automatic factory.

Wedded to tape control, in this unit is another natural partner—the automatic tool changer. Without operator intervention you can have milling, boring, drilling, reaming, tapping with a host of tools. Further, you can throw in automatic transfer, with loading and unloading in the idle station, while machining operation proceeds—the nearest thing to full machine utilization yet.

Industry Pattern—So numerical control comes of age. Experts in this field say that without doubt numerical control as applied to machine tools is the greatest single technical achievement that the metalworking industry has come up with in the past five years.

The pattern is definitely set. The general trend is to numerically-controlled machine tools with most of the major builders. One firm alone has manufactured and delivered about 150 such machines, comprising 10 entirely different configurations. Each machine, however, was designed specifically for numerical control. The greater portion of this amount—about 100,

CINCINNATI

represents the combination type unit.

More Coming—Look for more such combinations to be unwrapped at the Chicago Exposition. Whether a machine's design antecedents are basically drilling, boring or milling, there are many that can and will be modified to get in step with the trend.

One recently announced is a cross-rail type vertical boring, drilling and milling machine. It has been married to what one industrial leader terms "flexible automation"—punched tape control with automatic tool changing.

This unit takes a larger size casting, for a one-piece tractor frame, than has been possible previously. With twice the range of present vertical spindle units, this is expected to handle 80 pct of all job shop machining requirements. It has accuracy of a jig borer, and will take heavier cuts, the builder notes.

Unusual feature is method of tool changing. Instead of tool-carrying arms or mechanical linkages, tools stand upright in a pigeonhole magazine. This is located at the side or on the surface of the worktable. An orienting control stops spindle rotation at the proper point to align with stored tools.

Other Controls — From small profilers to large skin mills, you have a wide choice of types of tape control. You can have point-to-point systems. Or even dial and plug-in types of programmed, automatic cycle control that the operator "programs" himself on the shop floor. Kellering mills have been redesigned for numerical control, too.

And experts say it's just a matter of time before they'll be handling contour die work—such as the extensive model-change project of the auto industry.

Another development is a duplex cavity miller. This is a machine designed to mill opposite sides of either ferrous or non-ferrous workpieces simultaneously with 3-D magnetic tape control. It's especially recommended for forgings, to reduce distortion, often a problem with such parts.

One type of tape contouring features an interpolating control. It fits portions of parabolic curves to the contour, in place of the straight-line segments commonly employed.

Then there's remote control. This is an improved manual type for large machines. A combination of electronics and hydraulics simplifies the operator's job. Pendant type control stations are being widely adopted for large machines, such as skin and wing millers.

Further Gains—The milling field has benefited in other ways, also, by our advancing technology. Such general advances that can be cited include greater precision and capacity of equipment now available.

Current design is providing greater rigidity in general purpose units. Also, some new designs are combinations, bed type millers with design features that give versatility and some of operational scope of knee and column-type machines.

Improved tracing devices have updated fixed bed machines and die-sinking and profiling types. Another new influence in milling machine productivity is advance in spindle design. Many improvements enable operators to change cutting tools faster, cut idle time.

All in all, milling machines have become truly high-efficiency tools for metal removal. Through the use of these newer controls, machining costs are reduced.

Grinding and Honing

Look for above and below line centerless grinding . . . Horizontal stack honing shows promise

▪ Progress in grinding and honing technology has set a steady, if less spectacular pace than some other areas. But there are many solid achievements to report. Production rates are on the rise. Faster stock removal comes from higher wheel speeds, up as much as 50 pct.

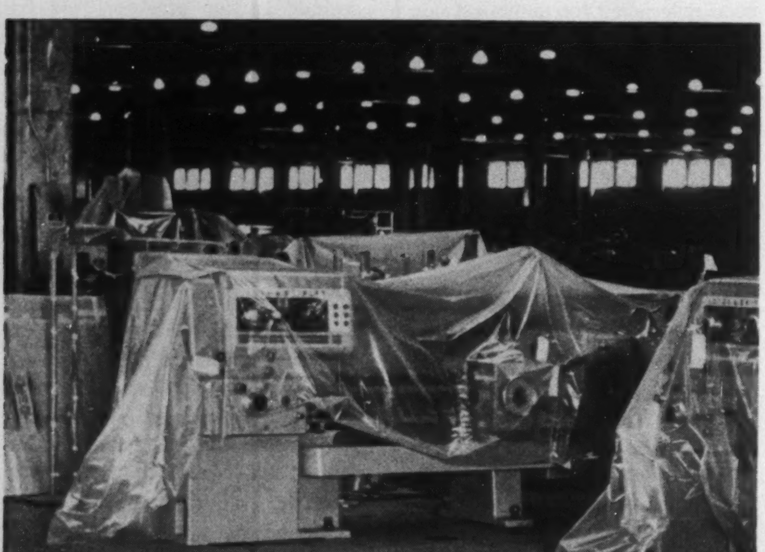
Again, these finishing processes are benefiting tremendously from automatic control techniques. These developments, plus improved methods of moving parts into and out of work position, are cutting non-productive time dramatically.

Also, the combination of design and control improvements are paying off in greater precision. For instance, tolerances on parts ground by the crush-dress process have been narrowed on lateral spacing of cylindrical forms and grooves to as small as 50 millionths-inch. Five years ago three ten-thousandths was considered good.

Crush Dressing Grows—Interest in the crush dress process is on the upswing, with technical developments. Wheel hardness ratings from "Q" up to "U" range are now used, in place of "K" to "P" wheels.

To be presented at the forthcoming exposition is a new process: above and below centerline grinding. Two parts, one located above the wheel centerline, the other below, are plunge ground simultaneously. The technique is reported to remove 0.050 in. of stock on diameter per part in 1.8 seconds. Floor-to-floor time is 3.5 seconds for the two parts.

Rolls Ground—Use of the crush-dress process to grind multiple grooves, or passes, in rod mill rolls, is another recent innovation. The process promises important gains over conventional turning.



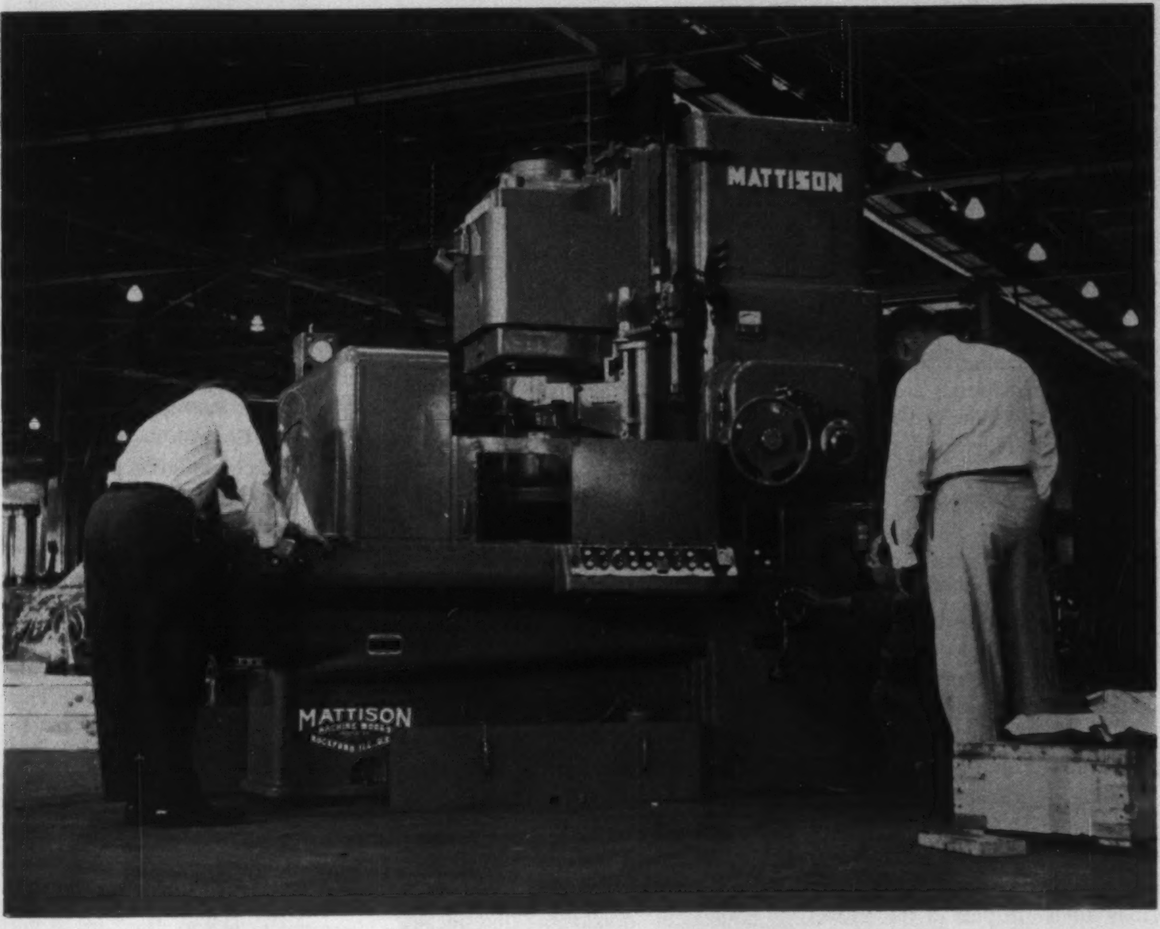
Grinding processes rolls of a hardness rating above 60-62 Rc. And result is reported to be more than double previous pass life. On typical rolls, grinding produced 13 passes in a bar mill roll in 80 min. as compared with 72 hours required to turn the roll.

Precision and Production—Centerless grinders, too, are sporting a new look: improved convenience, front and rear controls, cutting fluid mist control. These provide a new degree of precision.

Wider wheels (20 in.) in centerless work is cutting the number of passes needed. And they materially boost production of such typical items as water pump shafts, outer bearing races. Truing while machines are working is a time-saver. It has proved successful in thru-feed grinding as well as some special infeed jobs.

Auto Gaging and Control—Match hole grinding is another precision development in the millionths-inch range. It depends on an automatic gaging and sizing system. The method grinds the outside diameter of a shaft-piecepart to a preselected clearance with a prefinished inside diameter of the mating piece. And surface finishes are 2 to 4 micro-inch rms.

This trend to automatic control is exemplified in many other developments. You can cite automatic dual rate infeed; auto gaging, and control of cycle time with automatic compensation for wheel wear and truing; in-process and post-process gages that feedback signals for wheel adjustment when part trend is toward out-of-tolerance; automatic form grinding using continuous form dressing.



Cuts Bottlenecks—Grinding continues to prove one of the most flexible production processes, breaking many bottlenecks. Noteworthy examples include a dual machine that mates crush-true and centerless techniques. This one cuts machine time and speeds finishing of small parts. It gives close finish tolerance; handles tough jobs in fewer steps.

Another definite achievement since 1955 is grinding of hardened gears. This is a definite trend. The job is handling even finer sizes of gears—to 96 diametral pitch. Grinding after hardening eliminates the problem of heat treat distortion that's present when gears are ground soft. Result is smaller, lighter weight gears for aircraft, missile and computer design.

With the accelerated trend to miniaturization, a whole new scale of technology is being born. This Lilliputian industrial world relies heavily on grinding technology. Grinders now can produce precision bearing races with inside diameters as small as forty thousandths of an inch. Operating speeds are up to 100,000 rpm.

Where Honing Is Headed—Since the announcement in '55 of honing of ball raceways of anti-friction bearings, developments have shifted from the laboratory to the shop. Improved equipment and techniques have increased production capacity. Meanwhile, the range of bearings handled by the method is broadening. Big gain lies in reduced noise level and longer life of the product.

Another significant advance in finishing is honing of truncated spherical surfaces, namely ball studs. Techniques and principles employed make cutting speed uniform on every point on the sphere, even the crown. Result is generation of sphericity within 0.0003 in. The controlled surface finish runs 6-10 microinches rms.

The honing field is also benefiting from increased research and development work, other ways. One is a switch in machine design configuration that looks highly promising. This is horizontal stack honing. It should afford industry worthwhile advantages over multiple - spindle setups three ways: 1) high rates of production with substantial reductions in cost of equipment; 2) greater economy of abrasive, with application of longer stones; 3) improved machine design, as only a single spindle is required. This means less setup and maintenance, greater reliability, and fewer spare parts needed.

More Precision — Look for improved precision in a variety of small rounds in batch lots; a centerless-type hone promises fast, low-cost microfinishes.

Planing, Broaching, Shaping

Planer maker shows economy model . . . Shapers take to automation . . . Chain broaching is on the rise.

▪ In the planing, shaping and broaching fields trends are less well defined than in other areas of metal cutting. Advantages of numerical control are less apparent. Nevertheless, there may be some surprises sprung at Chicago. So far, however, design effort has been channeled into more conventional directions.

One that has already made its appearance is the economy model; like the compact car, plugging a competitive gap with stripped-down and simpler versions.

Meanwhile step by step advances to greater productivity—less idle time, more versatility and higher accuracy continue. Simplified pendants and automatic controls of various kinds are part of the answer. But use of newer materials in bettering basic machine design play a large role.

Redesign Pays Off—Large planers, often the "elephant" tool of the job shop, comprise an interesting example of complete redesign in interests of economy and simplification. Result is that you have a machine that is as accurate and productive—or more so—than previous ones, yet is being marketed for as little as 60 pct of former figures.

This is an example of how investment in design and engineering development pays off for user and builder. Skilful use of materials and clever engineering have eliminated some costly mechanisms.

One interesting feature is an arrangement with which it's possible to finish-plane simultaneously while double-cut roughing. This means precision cuts may be made at high speed, without a tool change. This exemplifies the trend to more production through slashing of idle machine time. The opposite instance is higher metal removal rates and double-cutting tools incorporating standard carbide tips in simple holders.

Dial-In Controls — Planer type milling machines were pioneers in numerical control. Now these machines are being equipped with the simpler dial-in programming.

One development is an automatic machine tool control that utilizes the building-block principle. In this field, experts feel, there are varying degrees of user requirements. This new control is a move to match status of a plant's job peculiarities. It allows the addition of more sophisticated elements as requirements and technology advances. These later additions to the system in the field are readily accomplished.

Shapers Specialize — Course of shaping developments is to extend the field of application with tooling and attachments. For one thing, tracing of parts by this method has advanced considerably in accuracy. Likewise there's a cost reduction per piece-part. A good example of this extension of the process to new work is rotor blowers' profile tracing. Workpiece is used in diesel engines.

Versatility of the machine is enhanced by a lockout switch that converts it back to a standard shaper. By modification of some components shapers are handling other difficult jobs: machining bodies of large stainless valves for nuclear subs, internally grooving castings, etc.

The shaper is hardly a machine that would be picked as a likely candidate for an automation line. However, the feat has been accomplished. A hydraulic machine recently was unveiled with full automatic cycle, including loading and unloading. The unit fits into conveyor-line automated production of sleeve bearings and is reported to run continuously without operator attention. It's a standard 24-inch shaper, with a special crossrail and toolhead.

Broaching Looks Afield—Engineers in the span since '55 have knocked down some formidable barriers. Two big ones are gears—external and internal. They said these jobs couldn't be done by broaching. Now they can.

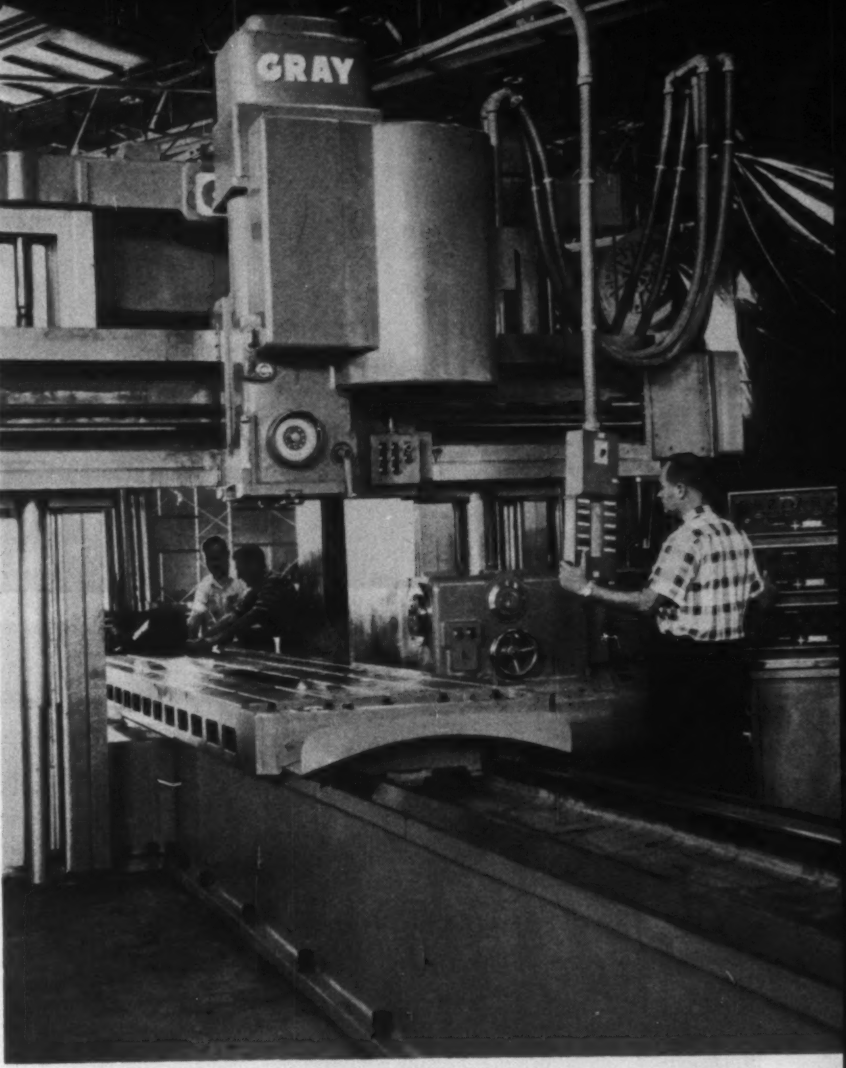
Secret lies in the tool. Machine used is simply any convenient hydraulic press. The process will knock out a finished helical gear in just five seconds. Like a cookie cutter. Applicable to cast iron, steel, bronze and nylon, the process gives teeth of exceptional smoothness and accuracy.

External and internal processes are similar. Internal gear generation may be trickier. In the method each tooth in successive rows of the long generation section cuts a portion of the tooth profile. Each row of teeth on the shell tool is full tooth form. Thus finished gear tooth surfaces are free of generating lines.

Other Advances — Horizontal surface broaching equipment is shooting the works, too. Electromechanical drives are zooming past previous power limits. A recent machine is rated 600 hp. It's said to develop a broaching force of 100 tons. These machines, although standard production types, are usually integrated in transfer lines with drilling and milling operations.

Linked with such developments are improvements in throw-away carbide broach tools. These mean increased economy in production. Chain broaching is still on the rise, too. It's an important process for in-broaching of small parts in large quantities.

Skill Built-In—Satellite shops are reported using broaching extensively on missile parts and other space hardware. It's one method to get repetitive accuracy without requiring great operator skill.

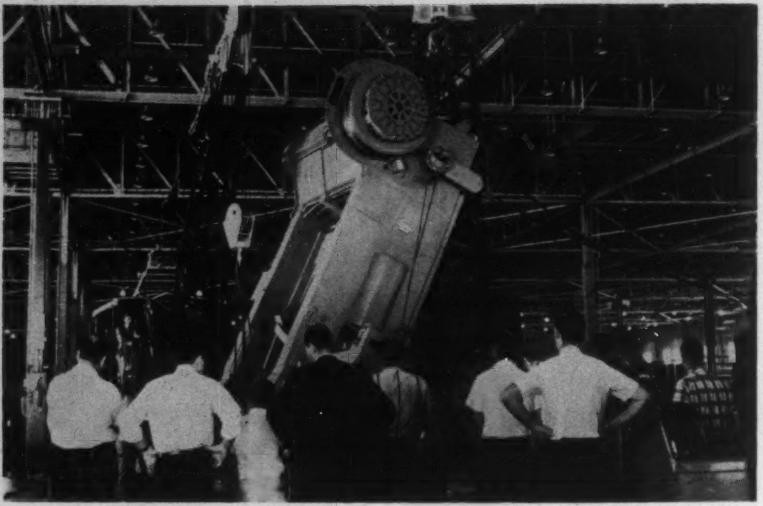


Build the programming into the tool, advocates of the process suggest. They point to a large vertical broach that handles eight different oil field valves by a set of 21 tools. And at no time during the cutting operations does an operator need to touch the broach, merely machine buttons. The process has simplicity and speed. That's why it continues to gain.

Gear Cutting — In the related field of gear production there appears little show of interest yet in ganging of multiple operations on a single machine—such as inline transfer or dial jobs. Instead, the preference seems to run to individual units which can be more convertible.

These are designed for integration into automated lines. Units are interlocked with automatic loaders, unloaders and conveyors. More elaborate setups add automatic gaging and feedback for automatic size control.

Stemming from nature of the product, tools for production of gears, splines and other toothed parts seem to resist the trend of numerical control. But the accent on production is lowering cycle times and product cost. One new gear shaper is reported to match 8 hours of production of 14 other machines—and in a period of 6½ hours.



Pressworking

Moving bolsters make gains . . . Smaller presses step up speeds . . . More controls for drop forging.

▪ Design of metalforming presses during the last five years has moved ahead steadily to meet industry needs for increased productivity, flexibility and simplicity.

Many evolutionary changes are noted, including, improvements in basic structure (greater rigidity) controls, die changing, and safety features.

Clutches and brakes, for example, have been developed to take service year after year with little wear and no heat. Greater flexibility in operation has been achieved by providing variable speeds, and incorporating automatic feeding arrangements.

Productivity Boost—Output potential has been greatly increased by speeding the movement of workpiece and material between operations with progressive dies and transfer mechanisms in the die. Improved design allows more effective use of feeds on presses.

Then there are more semimechanical feeding devices, mechanical arms, air injection, racks, trucks, cranes and other time saving devices.

Where applicable, cold extrusion is paying off as a high production process with low unit cost. Die design, part preparation and handling are tricky. But experts in the pressworking field are coming up with the right answers with ingenious setups.

Often this may mean special press features. Oversize housings to resist deflection, fault-indicating safety system, automatic recirculating lubrication system are some. Look for even more emphasis on cold forming processes this fall and in the future. A new horizontal extrusion press is being groomed for nonferrous work.

Quick Changeover — Most dramatic news, however, in presses is rapid - growing acceptance of the moving bolster. In the span of the last five years the first extra bolster press went into production. And early this year the first complete spare bolster line followed. As the word gets around, on the results of these installations, more and more interest is focusing on the rolling bolster.

Big savings with this type press, of course, is that dies can be set up for the next run, while the press is in full operation. Early production estimates suggest that machine utilization may jump up to as high as 90 pct. Output can be doubled.

Along with the moving bolster, other advances have aided in cutting die-changing time. These are mechanized die clamping, automatic slide adjustment and shut-height control. Use of electronics in the press control system gives complete finger-tip control of press ram and movable bolsters. A marked advance.

High Speed Contest—In smaller presses, and lighter work, press builders appear to be staging a race for higher and higher speeds. Recently announced is a 25-ton hydraulic stamping press, said to be capable of over 600 ram strokes per minute. Combination multiple slide and transfer presses can handle multiple operations to blank, pierce, form and bend at speeds up to 100 strokes.

But breaking the speed barrier is a 25-ton horizontal punch press that has successfully operated in excess of 1500 strokes per minute. Design breaks with tradition, too. The flywheel is centered in the bottom of the press, which also has a vertical crankshaft, magnesium slide and laminated plastic slideways for bearing surface. The press takes light gage metals and non-metallic materials.

Then there's the new triple action hydraulic blanking press that operates at 120 strokes per minute. Coupled with this are special dies. Together they give a straight, smooth-edge, precision blank, without the usual heavy burrs. Edge finish is said to compare favorably with grinding. Stamping costs are cut sharply, with the process.

Versatility Counts—Even in press brakes there are changes designed to make them do more. A new hydraulic type introduces greater accuracy in this operation. Centerline loading and micrometer stroke control coupled with attachments allow use as a press even in progressive die work.

Press Forging — Mechanization continues to move ahead in the field of press forging, too. There are a number of successful conveyorized setups for hot forging in automotive plants producing valves and parts up to crankshafts in size.

Most recent development is an automatic tong-feed forging machine, a horizontal, header type. This installation is producing axle flange forgings in the 7¼ inch machine size, largest yet achieved.

Drop Forging—The trend in drop forging equipment over the past five years is an added refinement of control and mechanization. One development of considerable importance has been introduction of electrically operated controls for air-lift gravity drop hammers. This in turn has facilitated use of automatic feeds for single blow, restriking, coining and embossing. Another thing, it has permitted incorporation of program controls for closed impression die, hot forging.

The latter gives a means for setting up a predetermined blow pattern. This development has removed much of the high operator skill required to control the hammer, turning it over instead to a program controller.

Enter Automation—There is a significant move towards use of impact blows for certain compacts, also to coin malleable iron castings to close tolerances. Equipment developed for these type operations include automatic work handling, and feature a high degree of versatility.

Most interesting advance of all is the automatic forging setup. These range from cold embossing through hot forging of agricultural equipment up to three pounds weight. These pioneering efforts foreshadow an unmistakable trend towards automation of drop forging, authorities in the field report.

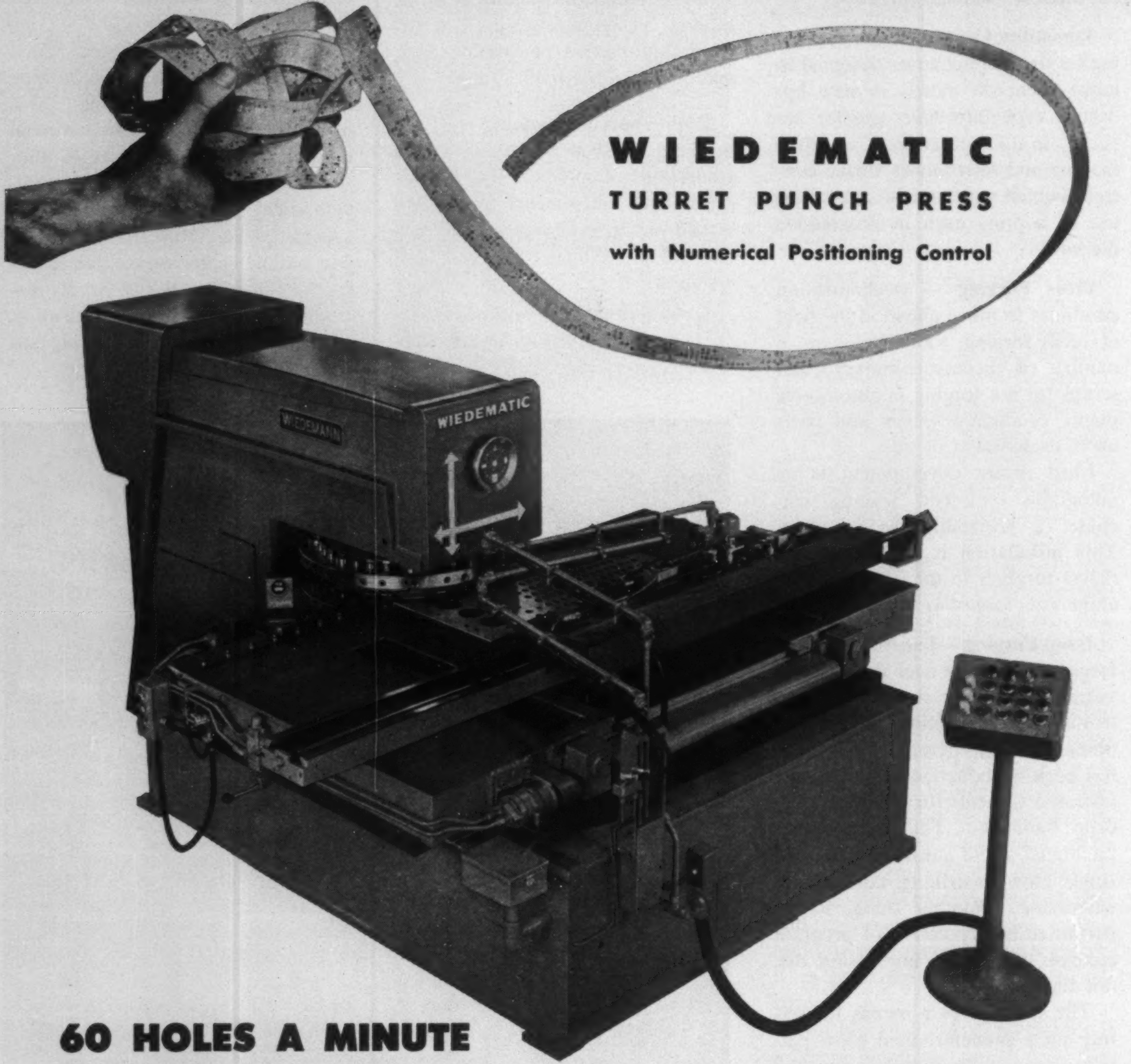
High Speed Forming — Cold heading research is paying off in greater operation flexibility. A wide range of odd-shaped parts are turned out in progressive dies from wire stock. As many as six stations are used.

Some interesting workpieces include a distributor cap insert, transistor case, spacers, links, ball seats for push rod ends, splined square-headed shafts and commutator bars. Even the difficult Phillips heads are formed now at a rate of 450 pieces per minute.

Single die boltmakers have added cutoff, pointing, and thread rolling in one automatic machine. This means many types of fasteners can now be turned out in a single unit.

Warm heading is another development that seems destined for a special place. Research shows it can handle many of the tough, refractory metals. While hardly expected to displace cold heading, look for it to play an increasing role on problem jobs.

SEE THE BIG ADVANCES



WIEDEMATIC

TURRET PUNCH PRESS

with Numerical Positioning Control

60 HOLES A MINUTE

with Automatic Work Positioning and Tool Selection

SEE the Wiedematic position and punch holes of many sizes and shapes automatically in actual production runs of sheet metal and plate parts.

SEE how all press operations are controlled with amazing speed and accuracy by an easily prepared punched tape.

SEE how the Wiedematic Method reduces production costs 60% to 90% and provides the key to major savings in every other phase of your operations from design to final assembly.

Be sure to see the Wiedematic in operation — Booth 1249 at the Machine Tool Exposition.

International Amphitheatre
Chicago, Ill. • September 6-16

REGISTER HERE, X

WIEDEMANN

WIEDEMANN MACHINE COMPANY
DEPT. IA-8 • GULPH ROAD • KING OF PRUSSIA, PA.

IN FLEXIBLE FABRICATION

WIEDEMANN TEMPLAMATION

Making Full Use of Low Cost Templates For Fast, Accurate Piercing

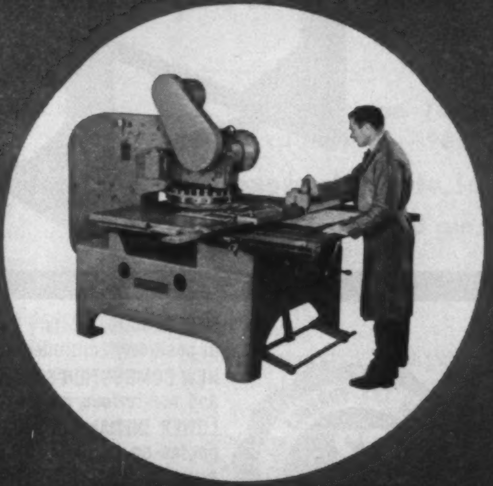
SEE how Wiedemann Templamation employs templates to ensure accuracy and reduce piercing costs.

SEE how high accuracy, templates are made rapidly on the COORDINATOR . . . inspected without guesswork on the direct reading INSPECTOR . . . then used for positive work positioning on a WIEDEMANN Turret Punch Press equipped with a high speed follower gauge.

SEE how Wiedemann Templamation gives you many of the advantages of automation with manually operated machines.

1. TEMPLATE IS MADE ON THE WIEDEMANN COORDINATOR

2. TEMPLATE IS INSPECTED ON THE WIEDEMANN INSPECTOR



3. TEMPLATE IS USED FOR HIGH SPEED HOLE POSITIONING ON THE WIEDEMANN RA-41P TURRET PUNCH PRESS

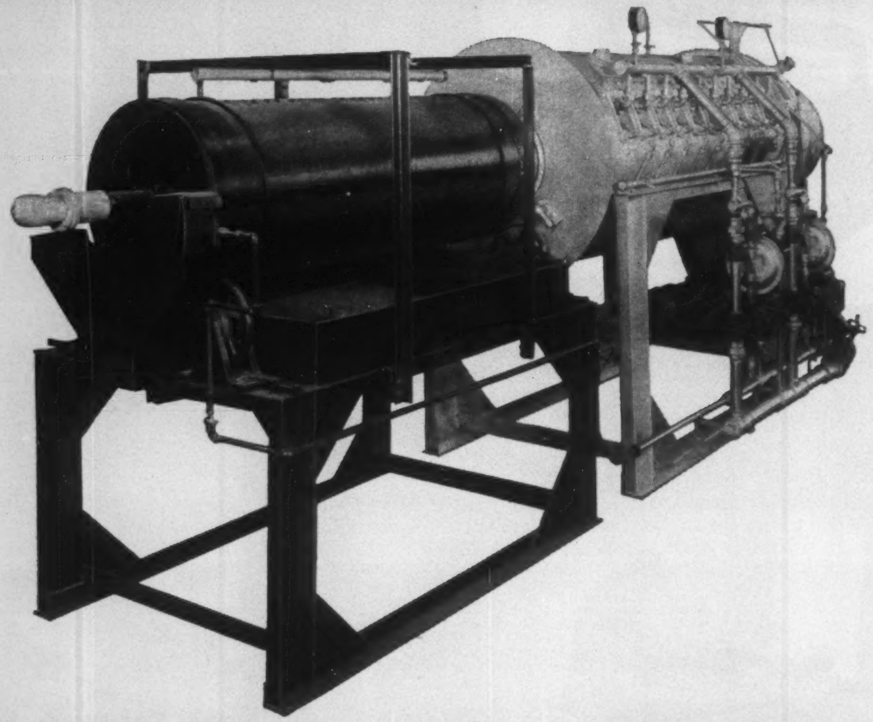
Other Wiedemann Turret Punch Presses will also be in operation.

THEN HEAD FOR THE FAR CORNER—BOOTH 1249

WIEDEMANN

Small Parts Annealing at Low Cost with an

AGF *Automatic Rotary Furnace*



NEW DESIGN... Rotary Retort with integral water jacketed cooling section—parts remain in positively controlled atmosphere during heating and cooling.

NEW COMBUSTION SYSTEM... 600° to 1800°F. operation permits processing both ferrous and non-ferrous parts.

LOWER INITIAL COST... Standardized designs result in a lower furnace cost which AGF passes on to you!

BUILT-IN FEEDER... Saves the several thousand dollar cost of a separate feeding device.

COMPACT DESIGN... Uses minimum floor space—far less than any type of conveyor furnace.

LOWER OPERATING COST... Automatic feeder hopper reduces work handling costs—Eliminates conveyor maintenance—alloy retort, with integral spiral, positively conveys work through heating and cooling cycle.

Investigate the cost-saving AGF potential... Details on request.

Quality construction and 82 years of furnace building experience assure you of a furnace with long and trouble-free operating life.

82 YEARS OF PIONEERING 1878 1958

CODE OF ETHICS SIGNER

AMERICAN GAS FURNACE CO.

1004 LAFAYETTE STREET — ELIZABETH 4, N. J.

Machine Tool Builders Exhibit At Chicago's Amphitheatre

The Machine Tool Exposition—1960

September 6 to 16

10 am to 5:30 pm

(Except Sunday)

▪ It's showtime 1960 and the National Machine Tool Builders' Association put together the greatest array of cost-cutting metalworking equipment ever seen under one roof.

The show, held once every five years will be housed at Chicago's International Amphitheatre. It will open on Sept. 6 for a 10-day run. More than 130 exhibitors will fill seven of the 12 acres with machine exhibits.

An estimated 200,000 business men, production men and engineers will get a wide-angle view of what American machine builders have developed. The benefits of which cannot be calculated in dollars and cents. Visitors will be able to make a comparison of the newest machine tools while they're in operation.

Registration at the Exposition will likewise admit visitors to the Production Engineering Show—and vice versa. Shuttle buses will run between the two exhibitions. There will also be bus service from Loop hotels to the Amphitheatre, from Loop hotels to the Navy Pier, and between both airports and the Amphitheatre.

Highlight in Controls—Look for a large number of machines equipped with ingenious combinations of memory drums and tape controls. They're designed not only to cut setup time, but to insure rapid and accurate production of any desired number of identical parts. These facts are basic to what you've been hearing and reading for the last five years.

Here's the chance to see for yourself what the machine tool builders have come up with. Comparisons can be made and views exchanged by executives and engineers to bring the shops up-to-date and cut product costs.

Needed Much Planning—Due to the great size of some machines, concrete-lined pits were installed so that visitors could see them from a better viewing level. In all cases, however, spectators will get a close-up view of the equipment in operation from one of several vantage points.

Thousands of tons of castings, forgings and other raw materials will be turned, milled, planed, drilled, ground or formed to give a more complete picture of each machine's capabilities.

Point To Remember — Product competition has gone international. People will not pay more for a product than they need to pay. The answer lies in how cheaply we as a

(continued on p. 210)

(continued from p. 209)

nation can produce.

Top executives are urged to take advantage of the opportunities which the Machine Tool Exposition affords. Positive thinking on the ways and means of retaining our markets banks on one word—modernization.

There are still in operation, on plant floors, many thousands of machine tools 10 years old or older. They were built to designs that have long since become obsolete—operating costs are higher.

New Machines Cut Costs — Mr. Alan C. Mattison, Pres., National Machine Tool Builders' Assoc., sums it up this way: "Suppose you have an old machine that turns out 100 work pieces per eight hour day. You replace that old machine with a new machine that turns out 200 work pieces per day.

"'You have already added something to burden, because of the capital investment in the new machine; but if wages remain constant there is less burden per unit produced. There is therefore a decrease in cost.

"In a competitive market the result would be a lower price, and competition would have to follow suit. In that way the benefits of technology can be passed on to the public in terms of better values."

List of Exhibitors

Exhibitor	Booth
Allen Co., Chas. G.	148
American Gage Machine Co.	1120
American Steel Foundries	1406
American Tool Works Co.	381
Anderson Oil & Chemical Co., Inc.	1531
Armstrong-Blum Mfg. Co.	1340
Atlantic Machine Tool Works, Inc.	543
Baird Machine Co.	1142
Baldwin-Lima-Hamilton Corp.	1226
Barber-Colman Co.	923
Bardons & Oliver, Inc.	741
W. F. & John Barnes Co.	641
John S. Barnes Corp.	641
Barnes Drill Co.	152
Beatty Machine & Mfg. Co.	243
Besly-Welles Corp.	251
Blanchard Machine Co.	1209
E. W. Bliss Co.	1325
Bodine Corp.	828
Brown & Sharpe Mfg. Co.	452
Bryant Chucking Grinder Co.	936
Buffalo Forge Co.	551
Buhr-Sidney Machine Tool Co.	1440
Burg Tool Mfg. Co.	834
The Carlton Machine Tool Co.	849
Cincinnati Gilbert Machine Tool Co.	1326
Cincinnati Lathe & Tool Co.	934
Cincinnati Milling Machine Co.	928
Cincinnati Milling Machine Co., Machine Tool Div.	1034
Cincinnati Milling Machine Co., Products Div.	1027
Cincinnati Shaper Co.	1230
Cleereman Machine Tool Corp.	632
Cleveland Automatic Machine Co.	900
Cleveland Crane & Engineering Co.	814
Cleveland Hobbing & Machine Co.	642
Colonial Broach & Machine Co.	241
Cone Automatic Machine Co., Inc.	1215
Covel Mfg. Co.	332
Danly Machine Specialties, Inc.	1250
Davis & Thompson Co.	146
Denison Engineering Div., American Brake Shoe Co.	914
DeVlieg Machine Co.	431
Dreis & Krump Mfg. Co.	1134
Eastern Machine Screw Corp.	745
Edlund Machinery Co., Div. of Harsco Corp.	531
Ekstrom, Carlson & Co.	846
Ex-Cell-O Corp.	946
Famco Machine Co.	331
Fellows Gear Shaper Co.	929
Ferracute Machine Co.	1122
Fosdick Machine Tool Co.	800
Frauenthal Div., The Kaydon Engineering Corp.	1220
Gallmeyer & Livingston Co.	751
Gardner Machine Co.	811
Geometric Tool Co., Div. of United-Greenfield Corp.	345
Giddings & Lewis Machine Tool Co.	1320
Gisholt Machine Co.	1042
Goss & De Leeuw Machine Co.	348
The G. A. Gray Co.	1350
Greaves Machine Tool Div., J. A. Fay & Egan Co.	1439
Greenerd Arbor Press Co.	541
Hamilton Tool Co.	486
Hannifin Co., Div. of Parker-Hannifin Corp.	652
E. F. Houghton & Co.	1538
Heald Machine Co.	924
Hill Acme Co.	1240
Hydraulic Press Mfg. Co.	1011
Illinois Tool Works	242
The Iron Age	1536
Johnson Machine & Press Corp.	352
Jones & Lamson Machine Co.	839
Kearney & Trecker Corp.	1008
Kempsmith Machine Co.	347
Kennametal, Inc.	1500
Kerns United Corp.	1511
Kent-Owens Machine Co.	547
Kingsbury Machine Tool Corp.	731
W. B. Knight Machinery Co.	824
L & J Press Corp.	1116
Lake Erie Machinery Corp.	542
Landis Machine Co.	432
Landis Tool Co.	823, 825
Lapointe Machine Tool Co.	1229
R. K. LeBlond Machine Tool Co.	810, 908
Lees-Bradner Co.	481
Leland-Gifford Co.	631
Le Maire Machine Tool Co.	150
Lodge & Shipley Co.	1046
Logansport Machine Co., Inc.	343
Mattison Machine Works	1206
Metallurgical Products G. E.	1539
Michigan Tool Co.	945
Micromatic Hone Corp.	1225
Minster Machine Co.	1339
Monarch Machine Tool Co.	701
Mobil Oil Co.	1527
Morris Machine Tool Co.	1445
Morton Mfg. Co.	1050
Motch & Merryweather Machinery Co.	822
National Acme Co.	781
National Automatic Tool Co., Inc.	1205
National Broach & Machine Co.	1430
Nebel Machine Tool Corp.	1319
New Britain Machine Co.	838
Niagara Machine & Tool Works	1330
Norton Company	651
Oliver Instrument Co.	342
Onsrud Machine Works, Inc.	749
Parker-Majestic, Inc.	1136
Peerless Machine Co.	422
Pope Machinery Corp.	482
Portage Machine Co.	338
Reed Rolled Thread Die Co.	421
Rivett Lathe & Grinder, Inc.	1210
Rockford Machine Tool Co.	1001
Seneca Falls Machine Co.	231
Sheffield Corp.	201
Sibley Machine & Foundry Corp.	341
Snow Mfg. Co.	247
Snyder Corp.	910
Springfield Machine Tool Co.	1110
Standard Electrical Tool Co.	1450
Sun Oil Co.	1513
Sundstrand Machine Tool Co.	1014
Taft-Peirce Mfg. Co.	1426
Thompson Grinder Co.	850
U. S. Dept. of Commerce	1551
U. S. Tool Co., Inc.	842
Van Norman Machine Co.	351
Vickers Inc.	1508
Warner & Swasey Co.	451
Wiedemann Machine Co.	1249
K. R. Wilson, Inc., Hydraulic Div.	1444
Wysong & Miles Co.	1149

1
"SilMag" ALLOYS for DUCTILE IRON

2
DUCTILE IRON
plunging
Sil Mag

A comprehensive brochure on ductile iron, its properties and applications. Includes data on melting, desulfurizing, alloying, heat treating, and foundry practice. 23 pages including many illustrations and charts.

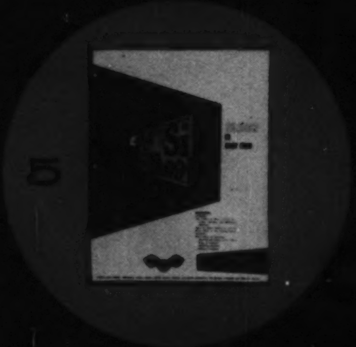
A study of the plunging technique for introducing magnesium alloys in ductile iron. Discusses cost and process advantages and special packaged alloy for this application. Illustrated, with charts on ladle dimensions and alloy additions.

Newly revised, details use of ferro alloy briquets for economic convenient additions to cast iron. Unique identification system ends all confusion in charging alloys.

HERE'S HELP!

There's help for you in each of the Ohio Ferro-Alloys publications shown here and you are welcome to all or any one of them without obligation. To receive your copies promptly, simply use coupon below or call the Ohio Ferro-Alloys office nearest you.

Birmingham • Boston • Chicago • Dayton • Denver • Detroit • Houston Kansas City • Los Angeles • Minneapolis • Philadelphia • Pittsburgh St. Louis • Salt Lake City • San Francisco • Seattle • Vancouver, B. C.



A comprehensive series on the function of these important alloying elements in cast iron, detailing various alloys available and a guide to their proper selection and use.

Ohio Ferro-Alloys Corporation
Canton, Ohio

QUALITY DEPENDABILITY SERVICE

OHIO FERRO-ALLOYS CORPORATION
CANTON, OHIO

Gentlemen:
Without obligation send me the literature checked.

☐ 1 Sil-Mag Alloys for Ductile Iron brochure
☐ 2 Ductile Iron brochure
☐ 3 New Briquet brochure
☐ 4 Chromium brochure
☐ 5 Silicon brochure
☐ 6 Manganese brochure

NAME
COMPANY
ADDRESS
CITY ZONE STATE

Williams-White 750-ton Hydraulic Bender and Straightener
at work for one of the nation's major steel producers

750-ton push--controlled to fraction of inch solves bending and straightening problems

Taking the kinks and curves out of square bars, rounds, flats or angles calls for a heavy hand with a light touch — the kind of easily controlled power delivered by Williams-White Hydraulic Benders and Straighteners.

Ample power and handling convenience team up with other built-in Williams-White advantages like these: *Massive frame structure; a heavily guided ram which is independent of the hydraulic cylinder; and wide open die space for easy access to the work area by crane or roller table loading.*

When you look into the future of your metal forming operations, look into the flexibility and reliability of Williams-White Hydraulic Benders and Straighteners. *Write for free Bulletin No. 73.*

107th year

WILLIAMS-WHITE & CO 600 Third Avenue, Moline, Ill.

the measure of Performance Reliability for more than a century

BULLDOZERS • PRESSES • SHEARS • BENDERS • PUNCHES • HAMMERS

FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Automatic Machinery

Automation components and entire assembly machines, for use in today's modern production requirements, are pictured, and their special purposes explained clearly, in a 46-page catalog. (Precision Detroit Co.)

For free copy circle No. 11 on postcard

Vertical Conveyor

Describing and outlining the many advantages of a completely new concept in vertical conveyors, a four-page brochure pictures the conveyor in use in several manufacturing plants. A simplified drawing indicates clearly what the conveyors do. (Standard Conveyor Co.)

For free copy circle No. 12 on postcard

Cast Alloy

The subject of a four-page engineering-data folder is a high-temperature alloy, with exceptional performance capabilities in the 1800-2300°F range. (American Brake Shoe Co.)

For free copy circle No. 13 on postcard

Sheet Polishing Mills

An eight-page illustrated catalog describes sheet polishing mills for finishing metal sheets, plates and coils. Typical applications for the line of sheet polishing mills are also described in the catalog. (Acme Mfg. Co.)

For free copy circle No. 14 on postcard

Industrial Water

Presented in a 24-page brochure is a description of the role of industrial water consulting service. The colorful booklet discusses the whole range of industrial water problems. Many examples of lower water costs are cited in the booklet. (For free copy write on company letterhead to Hall Laboratories, Hagan Center, Pittsburgh 30, Pa.)

Press-Room Equipment

Slide feeds, roll feeds, stock reels, stock straighteners, and coil cradles, are illustrated and described in a 21-page catalog. (U. S. Tool Co., Inc.)

For free copy circle No. 15 on postcard

End-Finishing Machine

An end-finishing machine is illustrated and described in a four-page bulletin. This machine provides higher production rates and greater accuracy on simultaneous deburring, facing and chamfering operations on tube, rod, or pipe ends up to 2-in. diam. (Pines Engineering Co.)

For free copy circle No. 16 on postcard

Molybdenum Metal

Molybdenum metal is the subject of a handbook which provides materials engineers with comprehensive information on the properties, production and fabrication of the unalloyed molybdenum metal. The handbook places special emphasis on new advances in arc casting and powder metallurgy. (Climax Molybdenum Co.)

For free copy circle No. 17 on postcard

Cylindrical Grinder

An eight-page, three-color, illustrated catalog describes a cylindrical grinder. Utilizing actual photographs and schematic drawings, the catalog offers detailed descriptions of the grinder. (Van Norman Machine Co.)

For free copy circle No. 18 on postcard

Band-Saw Blade

Widths produced, gages used, choice of teeth per inch, tooth styles, and types of set for band-saw blades are shown on a specification sheet. There is a cutting chart listing steels on which the blade is effective, their sawing characteristics, and recommended saw speeds. Included in the sheet is a listing of

---

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **8/11/60**

Circle numbers for Free Literature, Show Equipment or Tool Steel Directory Items:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100
101 102 103 104 105 106 107 108 109 110
111 112 113 114 115 116 117 118 119 120
121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140
141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170
171 172 173 174 175 176 177 178 179 180

If you want more details on products advertised in this issue fill in below:

Page ....Product ....

**INVALID WITHOUT COMPANY NAME—
PLEASE TYPE OR PRINT**

Name ....

Title ....

Product Manufactured ....

Company ....

Co. Address ....

City .... Zone.... State............

FIRST CLASS
PERMIT No. 36
NEW YORK, N. Y.

BUSINESS REPLY MAIL
No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE

Post Office Box 77, Village Station

NEW YORK 14, N. Y.

FIRST CLASS
PERMIT No. 36
NEW YORK, N. Y.

BUSINESS REPLY MAIL
No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE
Post Office Box 77, Village Station
NEW YORK 14, N. Y.

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **8/11/60**

Circle numbers for Free Literature, Show Equipment or Tool Steel Directory Items:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100
101 102 103 104 105 106 107 108 109 110
111 112 113 114 115 116 117 118 119 120
121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140
141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170
171 172 173 174 175 176 177 178 179 180

If you want more details on products advertised in this issue fill in below:

Page ....Product ....

INVALID WITHOUT COMPANY NAME—
PLEASE TYPE OR PRINT

Name ....

Title ....

Product Manufactured ....

Company ....

Co. Address ....

City .... Zone.... State............

FREE LITERATURE

some of the standard and automatic cutoff machines on which the blade can be used. (American Saw & Mfg. Co.)

For free copy circle No. 19 on postcard

Immersible Transducers

A catalog sheet describes bulkhead-type and end-fitting type immersible transducers. The catalog sheet includes photos, applications, features, their dimensions, input power and respective crystal radiating surfaces. (National Ultrasonics Corp.)

For free copy circle No. 20 on postcard

Steel Bars

An informative 9- x 12-in. case-study portfolio shows a variety of applications of steel bars in metalworking machinery and equipment parts. Containing a total of nine individual case studies, the portfolio shows how manufacturers are meeting and solving difficult problems related to parts production. (La Salle Steel Co.)

For free copy circle No. 21 on postcard

Detects Hidden Trouble

A one-page bulletin describes a portable time-speed recorder that detects hidden trouble in machine operations and processes. (R. B. Annis Co.)

For free copy circle No. 22 on postcard

Metal Forming

Pressure-shaping cold metal into desired thicknesses and circular shapes, is fully explained in an eight-page bulletin. A description of the machine, various shapes that can be formed, range of possible sizes, types of finishes, and the metals and alloys best suited for "rotoforming," are all included in the bulletin. (Commercial Shearing & Stamping Co.)

For free copy circle No. 23 on postcard

Power Units

Engine-driven electrical generating systems, in the range of 10-200 kw, are described in a bulletin. Included in the catalog is the firm's uninterrupted power supply for critical applications where even a few seconds' interruption in electrical power cannot be tolerated. Other products featured are adverse environmental power units and an automatic positive power system. (Consolidated Diesel Electric Corp.)

For free copy circle No. 24 on postcard

Malleable Castings

A 16-page illustrated brochure describes a company's products, services and facilities. A sample variety of the thousands of standard malleable and pearlitic castings, designed and produced by the 68-year old firm, is shown. (Canton Malleable Iron Co.)

For free copy circle No. 25 on postcard

Scrap-Handling Systems

How custom-engineered chip- and scrap-handling systems have provided substantial advantages in four different manufacturing plants, is explained and illustrated in a bulletin. Described and pictured in the bulletin are the standard company components which are "tailored" by engineers to solve individual handling problems. (Gifford-Wood Co.)

For free copy circle No. 26 on postcard

Precision Punches

Patented piercing accessories, a complete line of shoulder punches, interchangeable ball seat punches, pilot punches and set screw punches are included in a 36-page catalog. The entire company line is completely illustrated and charted with all dimensions and sizes available as standard stocked sizes or specials. (Pivot Punch and Die Corp.)

For free copy circle No. 27 on postcard

Fire Protection

Fire extinguishing equipment, for power plants and electrical installations, and the use of carbon dioxide for generator purging and coal bunker inerting are described in a bulletin. The pamphlet illustrates "hot-spot" hazards encountered in power plants. (Cardox Div., Chemetron Corp.)

For free copy circle No. 28 on postcard

Machine Tool Exposition Previews:

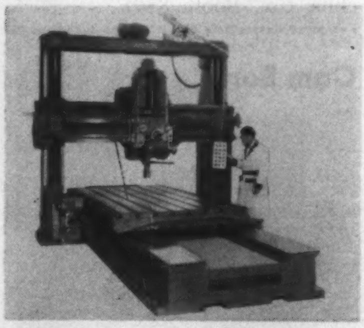
Drilling and Boring

The Machine Tool Exposition will feature machinery that reduces metalworking costs.

This equipment falls into six categories: drilling and boring; turning; milling, grinding and honing; planing, shaping and broaching and pressworking.

Vertical Drill, Bore

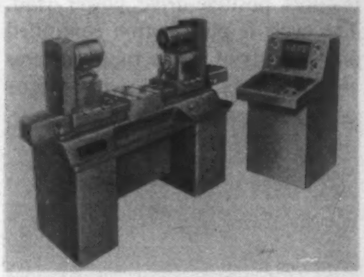
Tape-controlled, a drilling and boring machine drills and bores in the vertical plane. It has a planer-type table, with double housings and bridge to support the cross rail. The tape-control system directs the table movement longitudinally, and the head motion transversely. The speed and feed preselector is also controlled by tape. The table has a working area of 66 x 96 in. with a 25,000-lb capacity. There are 36 spindle speeds and 18 power feeds, which can cover a wide range of hole sizes. The spindle is powered with a 15-hp motor. (The Carlton Machine Tool Co., Booth 849)



For more data circle No. 30 on postcard, p. 213

Double-End Boring Unit

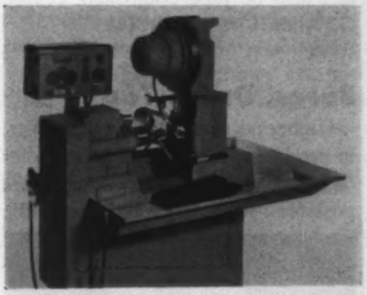
A machine tool bores holes at the same time from both directions — holes that are round within twenty millionths of an inch. Fast production is attained by the two moving heads plus the ability to effect fast setups with an electric programmer. The precision programmer makes it easy for the operator to employ a synchronized start for the two heads after which they run independently. It also controls rapid traverse, fine feed rate, dwell time, and rapid traverse reverse; also coolant flow, auxiliary components and automatic clamping of parts when desired. (Pope Machinery Corp., Booth 482)



For more data circle No. 31 on postcard, p. 213

Drilling Machine

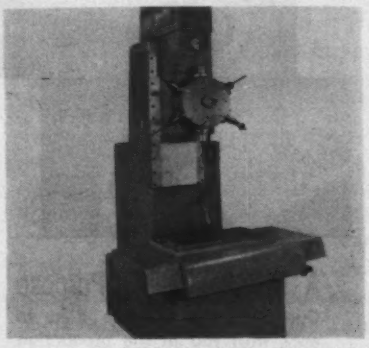
A horizontal drilling, tapping and threading machine can be hopper fed for long-run operations and hand fed for short runs. Six-thousand cycles per hour can be obtained. Drilling capacity is from #60-⅜ in., and tapping capacity from #0-½ in. (Snow Mfg. Co., Booth 247)



For more data circle No. 32 on postcard, p. 213

Automatic Drilling

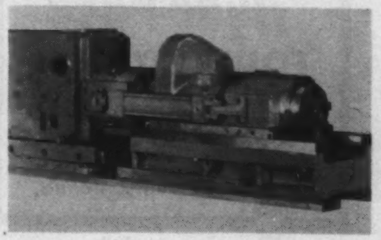
Simple to set up, a turret drill provides completely automatic drilling for a wide range of work. Six tools may be selected at random from the turret. Selection is automatic from tape command, or may be manually controlled. All six spindles are reversible so they may be employed for tapping. Spindle reversal is automatic at the depth programmed on the tape. Both spindle speed and feed rate are tape controlled for each spindle, with 100 feed rates from 0-100 ipm. Eight spindle speeds are from 190 -3000 rpm. (Cincinnati Lathe & Tool Co., Booth 934)

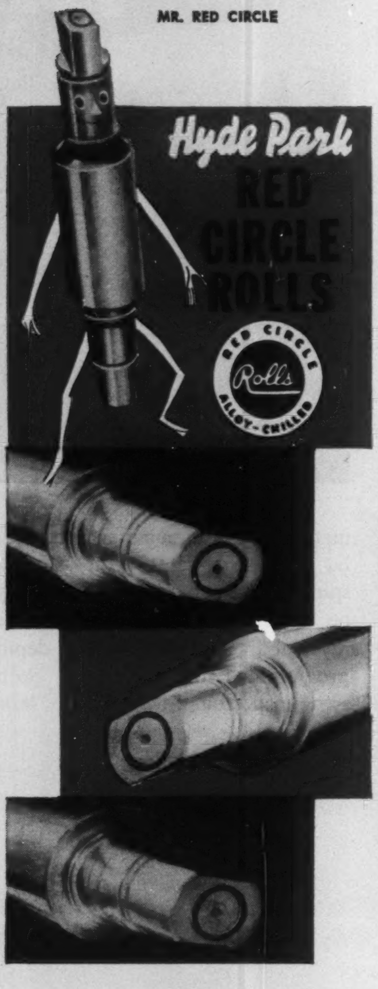


For more data circle No. 33 on postcard, p. 213

Boring Head

Driven by a drilling unit, a boring head comes with a coolant distributor for gun reaming. A solid housing working in a slide provides





A Roll for Every Purpose

Our engineers will be glad to work with you in the production of any special rolls or rolling mill equipment.

IRON BASE TYPE ROLLS
Nickel Alloy Grain Rolls
Nickel Chilled Rolls
Grain Rolls
Chilled Rolls
Moly Rolls
Nodular Iron Rolls

Hyde Park
FOUNDRY AND
MACHINE CO.
HYDE PARK
Westmoreland
County, Penna.

RC

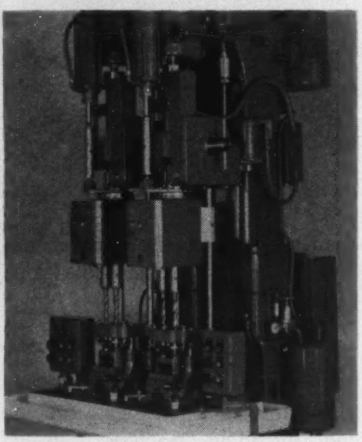
Rolls
Rolling Mill Equipment
Gray Iron Castings

a rigid mounting of spindles for large tools working to close tolerances. The maximum stroke of the head is 7 in. with the long stroke unit or 3½ in. with the standard unit. (Kingsbury Machine Tool Corp., Booth 731)

For more data circle No. 34 on postcard, p. 213

Power-Feed Drill

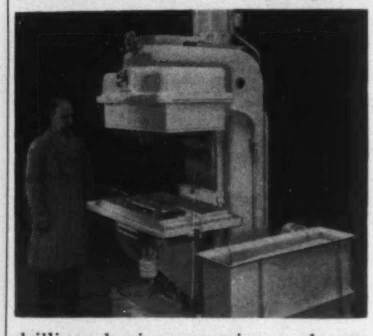
A two-spindle drilling machine features positive-drive power feed. The cycle is push-button controlled and consists of power rapid traverse and adjustable dwell with torque limiting clutch in feed shaft. The power feed can be automated with index tables or transfer fixtures; it can also be tape controlled. (Chas. G. Allen Co., Booth 148)



For more data circle No. 35 on postcard, p. 213

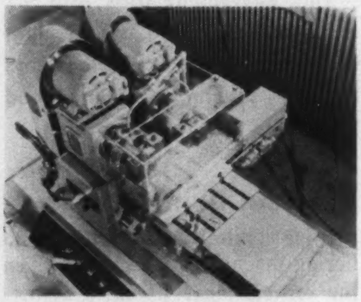
Bores, Drills, Taps

Higher accuracies and lower costs, in producing large numbers of holes on relatively complex parts, are possible with a multiple-spindle drilling, boring, reaming and tapping machine. The design of the work heads eliminates all gearing, permitting close center distances, reducing cost of interchangeable work heads, and speeding changeovers. Two models, with either an 18- x 36-in. head or a 9- x 14-in. head, are designed primarily for work with nonferrous metal parts. (Sundstrand Machine Tool Co., Booth 1014)



For more data circle No. 36 on postcard, p. 213

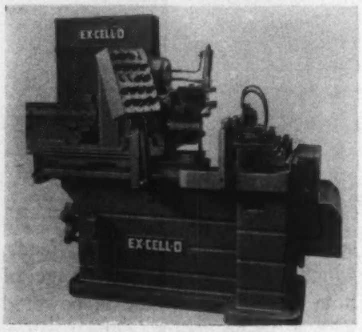
Boring Machine



High in performance, a boring machine with single or multiple spindle setups turns, bores, or faces with close precision. One of the jobs at the show features the complete machining of both inside and outside surfaces of stainless steel cups in a single 20-second machining cycle. (Jones & Lamson Machine Co., Booth 839)

For more data circle No. 37 on postcard, p. 213

Cam Bore



A highly-versatile boring and contouring machine utilizes direct cam action on both table and cross slide. It is capable of performing precision contouring, boring, turning, facing and grooving operations, either singly or in various combinations, to very close tolerances. Ease and simplicity of changeover is a feature of this machine. (Ex-Cell-O Corp., Booth 946)

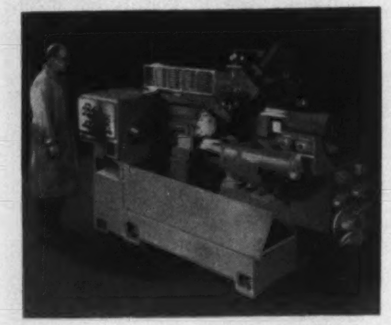
For more data circle No. 38 on postcard, p. 213

Machine Tool Exposition Previews:

Turning Equipment

Multi-Cycle Lathe

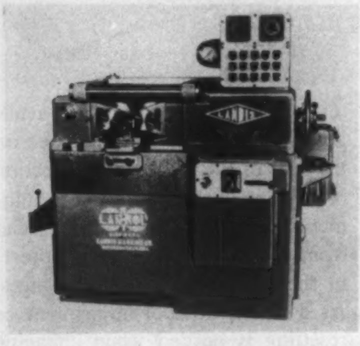
Separate facing-tools cross feed multi-cycle tracing lathes at any pre-selected time during the cycle. These facing tools are usually set to operate during the semi-finishing cut. This eliminates their pressure on the part during the finishing cut. Cross feed rates are infinitely variable from 1 to 180 ipm. Rapid traverse rate is 180 ipm. Another feature of the machine is the ease and speed of setup. This makes it ideal for small as well as production lots. (Sundstrand Machine Tool Div., Sundstrand Corp., Booth 1014)



For more data circle No. 39 on postcard, p. 213

Automatic Threading

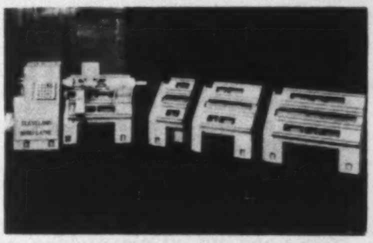
With a diametrical range of 0-3 in., an automatic unit threads and knurls both in one pass at production rates up to 100 completed parts—threaded and knurled—per minute. The machine is completely automatic. Only visual inspection is required by the operator. In operation, a vibratory hopper feeds parts down an inclined chute to the machine's indexing workrest. The workrest is timed with the machine's operation. It indexes a blank into rolling position as the preceedingly completed blank is ejected. (Landis Machine Co., Booth 432)



For more data circle No. 40 on postcard, p. 213

Modular Machines

A combination of many production proven components join with any one of four headstock combinations and six beds. This creates the following types of machines: profile lathes of both 180° and 270° configurations; turret lathes; pedestal lathes; automatic bar- and chucking-production lathes (with or without profiling); production lathes; threading lathes; qualifying lathes; stub lathes; and many other combinations. These machines are notable for their rigidity, precision, and dependability, as well as low cost and great changeover flexibility. (Cleveland Hobbing & Machine Co., Booth 642)



For more data circle No. 41 on postcard, p. 213

Vertical Turret Lathe

With a five-position turret rail head, a 42-in. vertical turret lathe also has a right-hand, four-position turret side head. The numerical-control system automatically positions the nine different tools carried by the two turrets. Cam-locked toolholders in the turret rail head speed tool change for greater economies in tape-controlled small-lot machining. Powered by a 50-hp motor, this machine has a 42-in. diam table, speed ranges from 6-320 rpm, feed ranges from 0.0007-0.576 ipm. (Giddings & Lewis Machine Tool Co., Booth 1320)

For more data circle No. 42 on postcard, p. 213

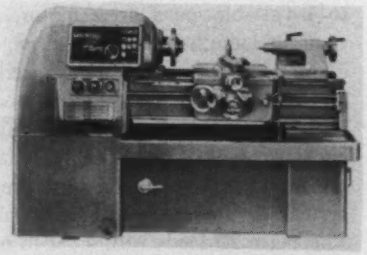
Variable Threading

A variable threading and turning lathe will be exhibited at the show. This unit will be handling typical jobs. It uses single-point threading tools. The tools are supported by a saddle and carriage. They are positioned for the work—then the saddle is locked in place Positive cam action moves the longitudinal slide and the cross slide. These combined motions feed the tool into the work. The tool in-feed and the number of passes can be preset. (Gisholt Machine Co., Booth 1042)

For more data circle No. 43 on postcard, p. 213

Infinite Speeds

Infinite speed selection of a new line of lathes is conveniently controlled by increase and decrease pushbuttons. Indication is on a direct-reading tachometer. The infinite speed range plus constant

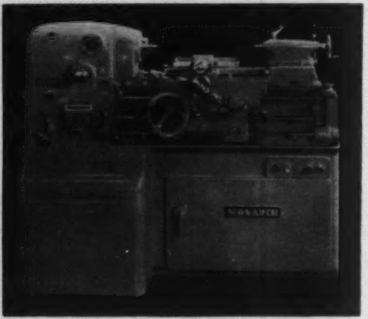


horsepower are provided by a highly efficient, proven mechanical-speed variator driven by an ac motor. This motor is equipped with hardened alloy steel members to insure long life. (The Nebel Machine Tool Corp., Booth 1319)

For more data circle No. 44 on postcard, p. 213

Toolmaker's Lathe

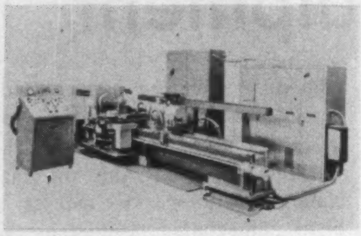
For precision turning, boring, facing and threading in the toolroom, a 10-in. lathe is fully proficient for super-accurate operations on such parts as small jet, missile, instrument, electronic and camera components. A 5-hp, dc-drive motor secures its power through an electronic unit which uses almost any source of ac current. This type of power supply minimizes vibration at all speeds. It practically eliminates noise. And it improves speed regulation regardless of load and maintains better torque at the lower speeds. There is also adequate reserve power for normal overload operations. (The Monarch Machine Tool Co., Booth 701)



For more data circle No. 45 on postcard, p. 213

Tracer-Control Lathe

Powered by a 50 hp constant 4 to 1 variable-speed drive motor, a versatile lathe has speeds in a range of 50 to 900 rpm, and these speeds are tape selected. Longitudinal and cross-feed screws are both anti-backlash ball screws. This lathe utilizes a flat template and the tracer system is 360° or 2-dimensional. There are 20 feeds with a range of ½ to 16 ipm. These are tape selected. There is an automatic indexing square-tool turret with a tape-selected position. The front face of the turret will travel from a point 10 in. in front of center to a point 10 in. behind center. (American Tool Works Co., Booth 381)



For more data circle No. 46 on postcard, p. 213

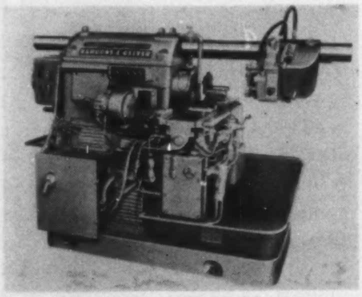
Lathe Threads, Turns

In addition to turning, facing, tracing, boring and cut-off operations, a lathe performs all types of threading. The lathe uses single-point carbide threading tools mounted on a cross slide that rests on a longitudinal slide. Both slides are supported by a saddle and carriage. They are positioned for the work at hand. Tool in-feed and number of passes are pre-set with automatic return to "first-pass" position and cycle stop after each sequence is completed. (Gisholt Machine Co., Booth 518)

For more data circle No. 47 on postcard, p. 213

Automatic Cutting

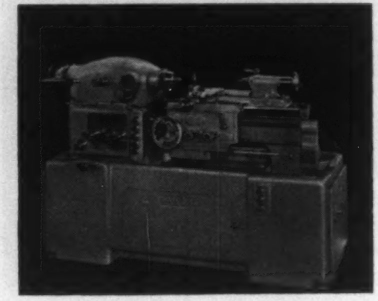
Designed to form, chamfer, groove and cut off pipe, tubing, or bar stock, an automatic lathe features several new attachments that increase the scope of work that can be handled. The positive stop and slide attachment with time delay allow forming to very close tolerances. The direct-acting remote control unit on the stock's stop allows cutoff of unlimited lengths. An improved OD chamfer attachment offers increased capacity and simplified controls. Carbide, roller cutter, and high-speed steel tooling will be shown. (Bardons and Oliver, Inc., Booth 741)



For more data circle No. 48 on postcard, p. 213

Toolroom Lathe

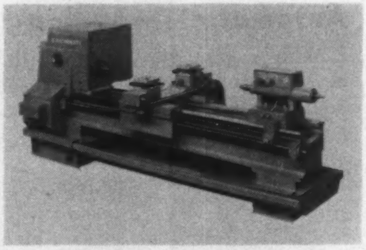
A double-duty machine combines an instrument lathe and an engine lathe. It has the sensitivity of an instrument lathe along with the ruggedness which carbine cutting tools require. It turns tolerances within 0.0004 in. and takes a ¼-in. cut at 0.020-in. feed in cold-rolled steel. This lathe is available in 20- and 30-in. centers. (Rivet Lathe & Grinder, Inc., Booth 1210)



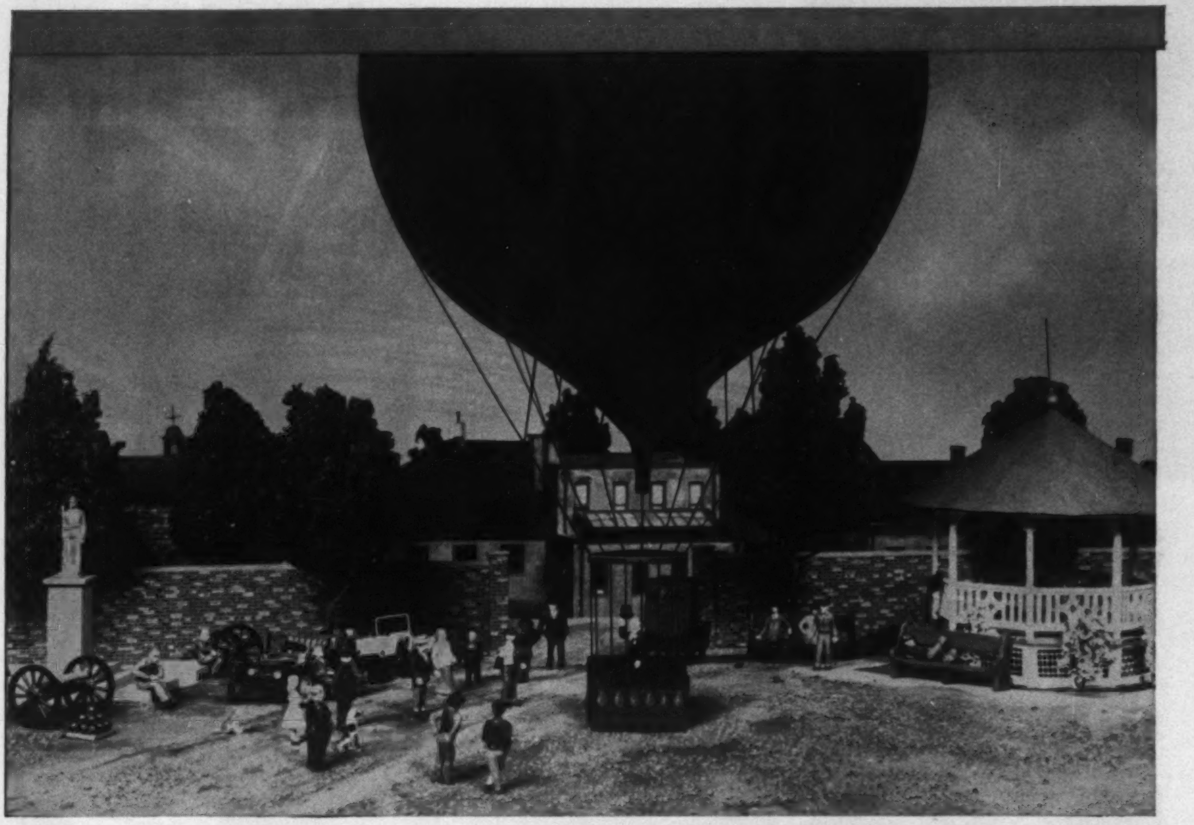
For more data circle No. 49 on postcard, p. 213

Short-Run Automation

Key to a new lathe's ability to economically automate short run work is the unit's tool-turret system. The 4-tool turrets are available—one on the front and one on the rear of the cross slide. Selection of any one of the eight tools is automatic, through commands read from the tape. All tools are preset in the turrets with accurate gages. As a result, no tool adjustment or resetting is needed when changing over from one part to another. (Cincinnati Lathe & Tool Co., Booth 934)



For more data circle No. 50 on postcard, p. 213



Are you up in the air over tubing sources?

If you have ballooning production problems, consider these important facts. OSTUCO Tubing is always the exact tubing you need for your product because OSTUCO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application — the precise grade, analysis, size, shape, special anneal and tolerances best suited to your needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing — is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, use Custom Made OSTUCO Tubing. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.

A-2449A

Model illustrated built to 3.5 mm scale.

OSTUCO
SHELBY, OHIO

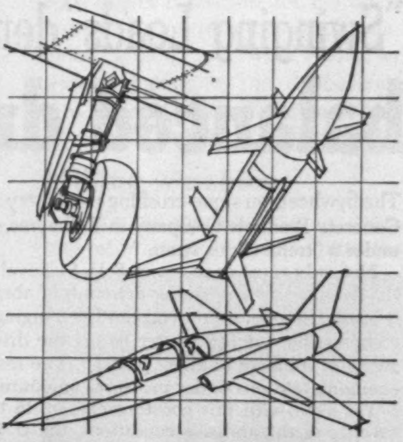
OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • SHELBY, OHIO

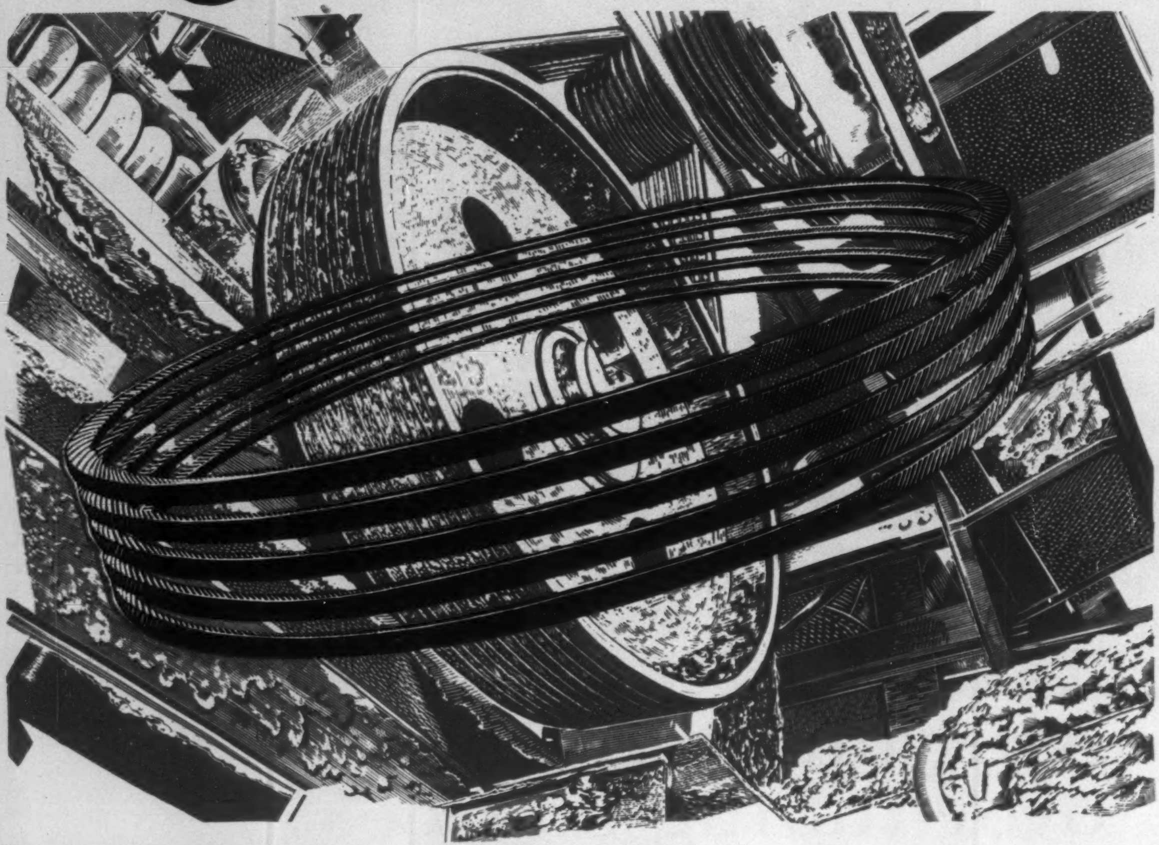
Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Kansas City, Los Angeles (Lynwood), Miami, Moline, New York, New Orleans (Chalmette), Philadelphia (Wynnewood), Pittsburgh, Richmond, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

CANADA: Railway & Power Engr. Corp., Ltd. • EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York



U. S. ROYAL V-BELTS from the Power Unlimited complete belt line



"Swinging Loads" demonstrate how balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U. S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives, like all of the approximately 250 "U. S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

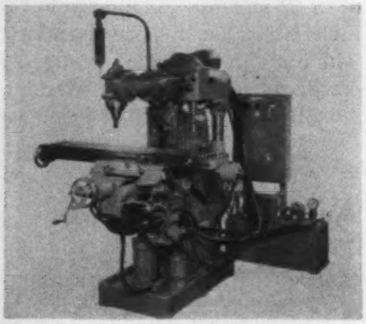
Rockefeller Center, New York 20, N.Y.   In Canada: Dominion Rubber Company, Ltd.

Machine Tool Exposition Previews:

Milling Machines

Scanning Mill

The benefit of automatic scanning is part of a heavy-duty milling machine. Basically, in the scanning system the tracing stylus automatically follows the contour of a master, regardless of whether it has straight walls, angles, or curves to be cut. Constant-torque hydraulic motors provide the rotary power.

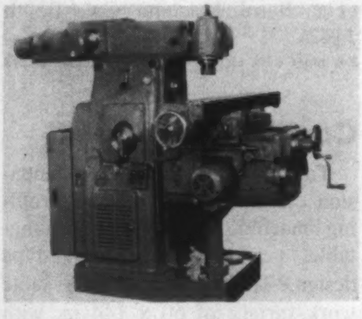


Adjustable stops, operable from either the motion of the table saddle or the motion of the knee, trip the table reversing valve at the end of each stroke; at the same time, an indexing motor crossfeeds the work for a new cut. (Greaves Machine Tool Co., Booth 1439)

For more data circle No. 51 on postcard, p. 213

Versatile Miller

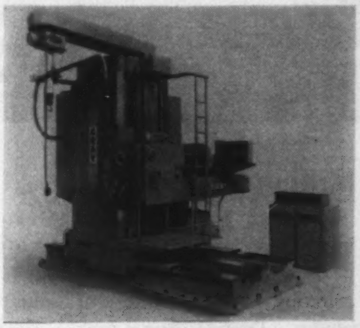
A motorized ram with vertical and/or universal head attachments, for angular, multiple-surface, vertical and horizontal milling, is driven by a 3-hp. motor. The electrical controls are at the front and rear of the machine. Electrical interlocks separately motivate the head, the machine spindle or both together Dial-selected speed-change mechanism has eight changes and ranges of 50-2250 rpm. The motorized ram can be adapted to any company mill in the field. (The Kempsmith Machine Co., Booth 347)



For more data circle No. 52 on postcard, p. 213

Carbide Milling

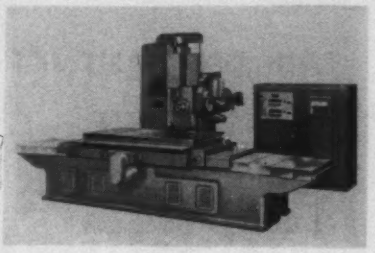
Designed to increase machine productivity in high-speed carbide milling, a horizontal boring, drilling and milling machine has an attachment which permits low mounting, resulting in constant rigidity, heavier feeds, and faster cuts. A jib crane with a 2000-lb lifting capacity is self contained and rotates 360 degrees, making mill operators independent of other shop facilities for tool changes. Other outstanding features are the power-operated draw bar, 100-pct non-metallic ways used throughout, and the multi-ton column and head that may be push-button set to within 0.00025 in. (The G. A. Gray Co., Booth 1350)



For more data circle No. 53 on postcard, p. 213

Jig Mills

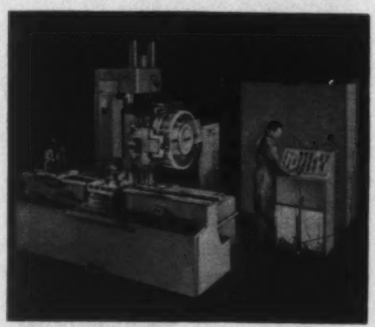
With spindle sizes ranging from 3-5 in., a series of jig mills bores, mills, drills and does other operations. In addition to greater range, the machines are more rugged, easier to operate and more accurate. Features incorporated into the new series include simplified controls and thermal control of main spindle bearings for increased accuracy. Another feature is wider bed and table for added stability and working range. Also featured for the mill line is a system of automatic point to point positioning. This makes it possible for the operator to control locations of the machine spindle and work table by simply dialing in the dimensions. (De Vlieg Machine Co., Booth 341)



For more data circle No. 54 on postcard, p. 213

Milling Machine

A milling machine has the capacity of a large bed type plus the versatility of a knee type. A 50-hp motor powers the spindle through 24 speeds ranging from 15-1500



Somers® THIN STRIP

COMPUTER TAPE

FOR PERMANENCE LIKE THE CENSUS RECORDS

Only metallic computer tape assures the resistance to stretching or distortion under heat and the complete non-absorption of water necessary to preserve important data like the U. S. census indefinitely under varying environmental conditions.

And Somers Thin Strip tape provides:

1) optimum accuracy of recording and reproducing with controlled micro finish.

2) processing economy with coils of .001" metal up to 14,000 feet long without joining.

For computer tape and all Thin Strip requirements make Somers your permanent source of supply. Write for Confidential analysis of your application—no charge or obligation.

FOR EXACTING STANDARDS ONLY

Somers® THIN STRIP

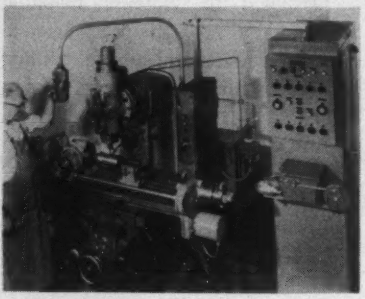
Somers Brass Company, Inc.
102 BALDWIN AVE., WATERBURY, CONN.

rpm. Spindle speeds are selected and changed through an electro-hydraulic system directed from the pendant. The full 50 hp is delivered at each spindle speed. (Kearney & Trecker Corp., Booth 1008)

For more data circle No. 55 on postcard, p. 213

Cam Milling Machine

Tape controlled, a cam milling machine machines unusual contours. These include cylindrical, conical and flat-surface master cams. Hole patterns can also be machined in any of the mentioned shapes. Master cams can be machined using a full automatic cycle of the machine controlled by 1-in. wide eight channel tapes. (Brown & Sharpe Mfg. Co., Booth 452)



For more data circle No. 56 on postcard, p. 213

Milling Cutters

Standard ¾-in. square throwaway carbide inserts, with eight indexable cutting edges, eliminate grinding and resetting of cutter blades. Double-acting lock screws in one-piece wedge-seats facilitate indexing inserts and prevent loosened seats from falling out. A 15-degree peripheral cutting-edge angle minimizes pressure on workpieces. Cutter bodies are designed for heavy chip loads and high rates of metal removal. There are left-hand and right-hand cutters in five diameters: 4, 6, 8, 10 and 12 in. (Kennametal Inc., Booth 1500)

For more data circle No. 57 on postcard, p. 213

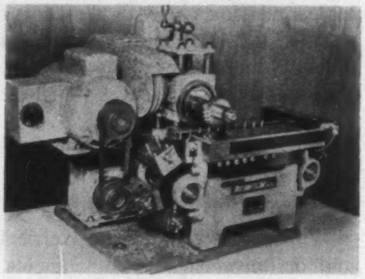
Constant-Feed Mill

With 24-in. table travel, a milling machine rapidly performs milling operations. Added features include improved hydraulic control for both climb and conventional milling; feed-rate controls with built-in heat compensators resulting in a more constant feed. The machine has a 48- x 12-in. table, and full automatic table cycle. The mills are furnished with a 5-hp spindle motor as standard. (Kent-Owens Machine Co., Booth 547)

For more data circle No. 58 on postcard, p. 213

Automatic Mill

For production milling rates up to 6000 parts per hour, an automatic milling machine is capable of maintaining tolerances of ±0.001 in. in milling precision electronic components as small as 0.050 x ¼ in. and tool bits as large as 1-in. square. The mill can be attached to the end of any milling machine. (The Baird Machine Co., Booth 1142)



For more data circle No. 59 on postcard, p. 213

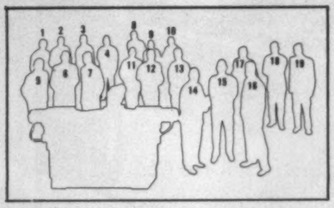
Continuous-Path Mill

Tape-controlled, a three-dimension continuous milling and profiling machine is of the traveling-table, vertical-spindle, bridge-type design. The machine has a table work surface of 60 x 144 in. with multiple-axis control. (Ekstrom, Carlson & Co., Booth 846)

For more data circle No. 60 on postcard, p. 213

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY
KINGSBURY

See You in Chicago!



1 C J Hanrahan, asst. supt.
2 D A Piper, product engineer
3 W Szacik, eng. supervisor
4 J N McHoul, sales engineer
5 E J Patria, superintendent
6 C R Adams, chief sales engineer
7 H J Gaseau, sales engineer
8 R D Swahnberg, sales engineer
9 J R Jarest, asst. chief eng.
10 H N Langley, applications eng.
11 R R Grover, development eng.
12 C B Clark, chief engineer
13 A F Anctil, eng. supervisor
14 R B Vaughan, sales manager
15 G Swahnberg, president
16 E J Kingsbury, chairman
17 E R Guilbeault, mach. operator
18 H M Frechette, v. p. & gen. mgr.
19 E J Kingsbury Jr, v. p. & treas.

not shown in photo
N J Stankiewicz, service mgr.
A H Knight, sales engineer
C E Loos, electrical engineer
C O Snow, asst. to the supt.

3 Automatic Indexing Machines Show How to Combine a Variety of Operations

Here in booth 731 of the Amphitheatre is equipment that is unexcelled for high production drilling and tapping work to close tolerances. Here too are attachments for performing a variety of operations in the same chucking of the work.

All of us plan to be here (but don't worry, not all at once). And we want to show you . . .

— 3 automatic indexing machines

— 8 different models of automatic drilling and tapping units

— 11 different head attachments for a variety of operations — boring, milling, recessing, oscillating, angular feed, speeder, planetary speed reducer, etc.

— other accessories — two-position hydraulic slide, coolant distributor, bushing carrier, etc.

Left — a fairly simple setup with 20-inch index table and three automatic drilling and tapping units.

Rear — a large setup with 63-inch index table and a center column that supports ten units. Seven units are mounted on wing bases. Suitable for many operations.

Right — a new basic machine with 40-inch index table and no center column. This new addition fits into our line between the other two types.

These machines have no special tooling, but we will be glad to talk to you about designing, building and tooling a machine all ready to produce for you.

See you in Chicago! Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY

Pre-Engineering by **KAISER ENGINEERS**
answers basic plant expansion questions...

1961
1962
1963
1964
1965

Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

KAISER ENGINEERS

KAISER ENGINEERS engineers-contractors
Contracting since 1914

Oakland 12, Calif. — Chicago, New York, Pittsburgh, Washington, D.C.
Accra. Buenos Aires, Montreal, New Delhi, Rio de Janeiro, Sydney, Vancouver, Zurich

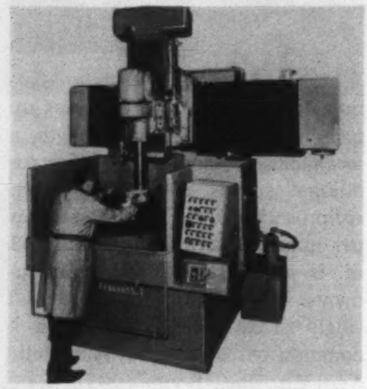
6229-S

Machine Tool Exposition Previews:

Grinding and Honing

Vertical Grinder

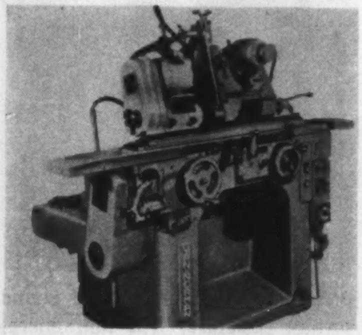
Precision to ±100 millionths of an inch is featured on single-spindle vertical tracer or numerically-controlled grinder. Designed for contour or conventional grinding, the machine also comes with a new electro-hydraulic tracer system with ±10 millionths of an inch electrical accuracy. Manual control is supplied as standard equipment. A continuous recorder shows deflection, indicating immediately any variation from true contour path between template and work slide and giving a permanent record of contouring accuracy. (The Kaydon Engineering Corp., Booth 1220)



For more data circle No. 61 on postcard, p. 213

Grinds Small Parts

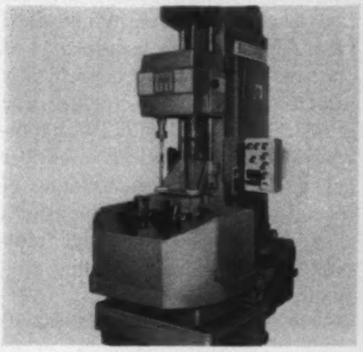
Fast, accurate, economical grinding of small parts is insured by a cylindrical grinder. Provided by several important design advancements in the form of optional accessories, crush forming and live or dead center operation is possible. In addition, an optional sure-set taper indicating gage allows exact swivel table adjustment to eliminate taper or produce a specific taper. (Van Norman Machine Co., Booth 351)



For more data circle No. 62 on postcard, p. 213

Hones Bores

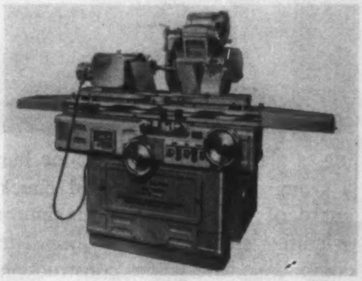
A honing machine hones bores up to 4-in. diam at full stroke. This honer is available with stroke lengths of 15, 25, and 40 in. and a choice of one or two spindles. Electric panels are conveniently positioned behind hinged doors in the column of the machine. (Barnes Drill Co., Booth 152)



For more data circle No. 63 on postcard, p. 213

OD-ID Grinder

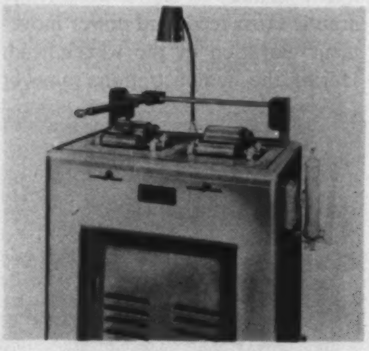
For cylindrical and internal grinding, a hydraulic-feed grinder was designed primarily for plants having to do a wide variety of external and internal grinding, but not enough of each to purchase specialized machines for each kind of work. The table is hydraulically operated at speeds from 3 ipm to 50 fpm. All hydraulic controls are conveniently grouped directly above the electrical control panel. The grinder is a rugged precision tool capable of taking rough cuts as well as producing the finest finishes. (Gallmeyer & Livingston Co., Booth 751)



For more data circle No. 64 on postcard, p. 213

Lapping Machine

Completely re-engineered, a centerless lapping machine has sturdier and more convenient cabinet housing. Its adjustable rolls can be adjusted quickly and easily by merely turning a crank which actuates a screw attached to the roll-bearing blocks. The mechanism is self-locking to assure proper positioning of the lapping rolls for large or small parts. "V"-belt driven rolls assure no vibration. The machine also has special lapping rolls for lapping

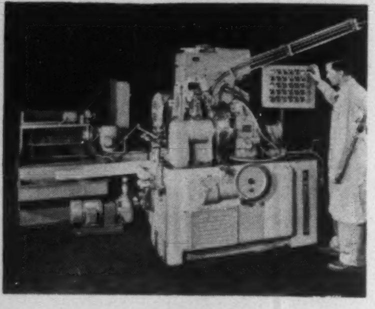


carbides. (Size Control Co., Booth 1120)

For more data circle No. 65 on postcard, p. 213

Grinds Many Forms

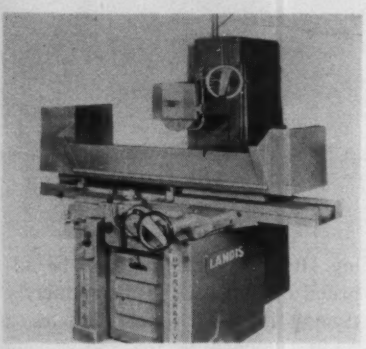
A grinder automatically grinds cylindrical forms and grooves on two or four parts at the same time; at wheel speeds of 9200 sfpm and faster. The wheel-dressing process employed on the machine uses a formed steel or carbide roll having the same profile as desired in the workpiece, to form an abrasive grinding wheel until the wheel has the reverse form of the roll. (The Sheffield Corp., Booth 201)



For more data circle No. 66 on postcard, p. 213

Automatic Grinder

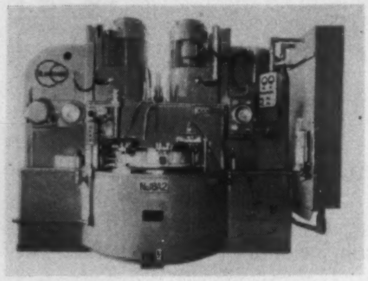
Featuring automatic increment feed of wheelhead, a surface grinder has hydraulic table traverse, hydraulic cross feed, and power movement elevation of the wheel head. During the demonstration, some of the following stages in the operating cycle to be pointed out are: setting of micrometer adjustment on wheelhead column for the amount of stock to be removed; automatic stopping of the wheelhead when size is reached; return of wheelhead to "up" position by pushbutton control. (Landis Tool Co., Booth 823-25)



For more data circle No. 67 on postcard, p. 213

Surface Grinder

Of a "dry-base" design, a two-spindle, automatic surface grinder has all interlocked controls. In operation, all coolant and chips flow out of the grinder to an outside settling tank or central coolant system.

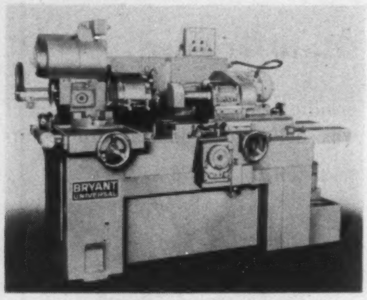


The design of this grinder provides easy access to the grinding-wheel area. Push-button stations and operator's control are conveniently located for ease of setup. The grinder is equipped with 30-hp foot-type spindle motors. The grinder has a plain table for mounting of special work-holding fixtures, and a six-speed gear box for table rotation. (The Blanchard Machine Co., Booth 1209)

For more data circle No. 68 on postcard, p. 213

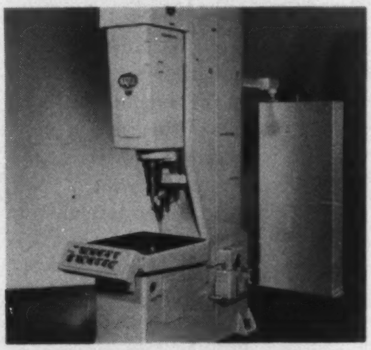
Universal Grinder

For inside- and outside-diameter, internal-face and rotary-face grinding, a general-purpose machine has a swing inside the standard chuck guard of 12 in.; with a maximum grinding stroke of 16 in. The compound wheelslide construction places the traverse slide above the cross slide. This cuts the reciprocating mass to a minimum, and allows the use of feed controls which do not reciprocate with the traverse motion of the wheelslide. (Bryant Chucking Grinder Co., Booth 936)



For more data circle No. 69 on postcard, p. 213

Honing Machine

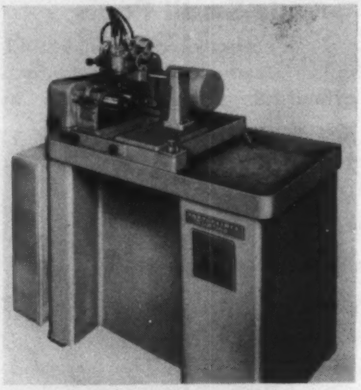


Designed for heavy-duty production honing operations on bores up to 3-in. diam and 3 in. in length, a mechanical honing machine has rotational speeds of 200-800 rpm; reciprocation from 60-240 strokes per minute. Stroke length up to 3 in. is adjustable in desired increments. The machines may be used singly or as multiple heads on a common base. (National Automatic Tool Co., Inc., Booth 1205)

For more data circle No. 70 on postcard, p. 213

Finishes Parts

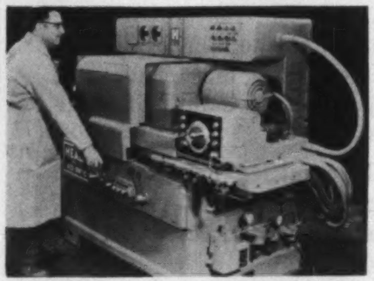
Self-contained, a micro-stoning machine operates with a fully-automatic work cycle. The machine finishes the outside diameter of all types of small parts which require an unusually-fine microinch finish, precise form accuracy, and sound surface structure. The unit micro-stones parts by turning between two rotating rolls, where they are kept



in contact with a rapidly oscillating abrasive stone. (Taft-Peirce Mfg. Co., Booth 1426)

For more data circle No. 71 on postcard, p. 213

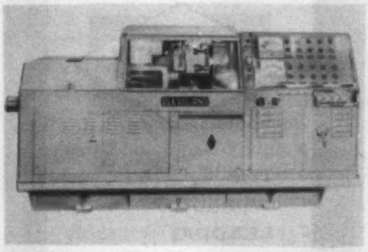
Internal Grinder



Providing a workswing to 8-in. OD and 90° included angle, a grinder's design allows heavier roughing cuts. Constant plus impulse feed advances wheel only at reversals of the table; provide improved finish and straightness on long bore-to-diameter ratio parts. (The Heald Machine Co., Booth 924)

For more data circle No. 72 on postcard, p. 213

Bar Machine



Ultra-modern, a single-spindle automatic bar machine has ten automatic infinitely-variable spindle speeds for each cycle of the machine. These speeds range from 40-3100 rpm. The ten turret feeds, like the spindle speeds, are infinitely variable and are dial controlled. (The Cleveland Automatic Machine Co., Booth 900)

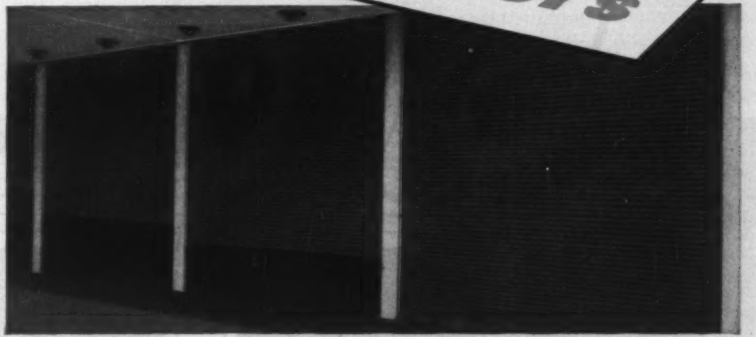
For more data circle No. 73 on postcard, p. 213

Drill Pointer

A bench-model drill pointer features a drill point having increased clearance at the center of the drill. The basic capacity of this unit is 3/32-½ in. Smaller drills can be sharpened by using a pin vise. The machine has self-contained diamond wheel dresser. (Oliver Instrument Co., Booth 342)

For more data circle No. 74 on postcard, p. 213

KINNEAR
Rolling Doors
REGISTERED



APPROVED
through
60 years
of service!

Extra durability is a *bonus* you get along with many other proved advantages of Kinnear Rolling Doors.

Striking new proof of this was recently added to Kinnear's records of remarkably long door service: A whole battery of Kinnear Doors with 50 years of service in a busy shipping terminal *were removed from the old building for continued use in the modern structure that replaced it!*

That's why it's important to you that every Kinnear Door is *Registered.* Detailed drawings of each door are kept permanently in Kinnear's own fireproof vaults.

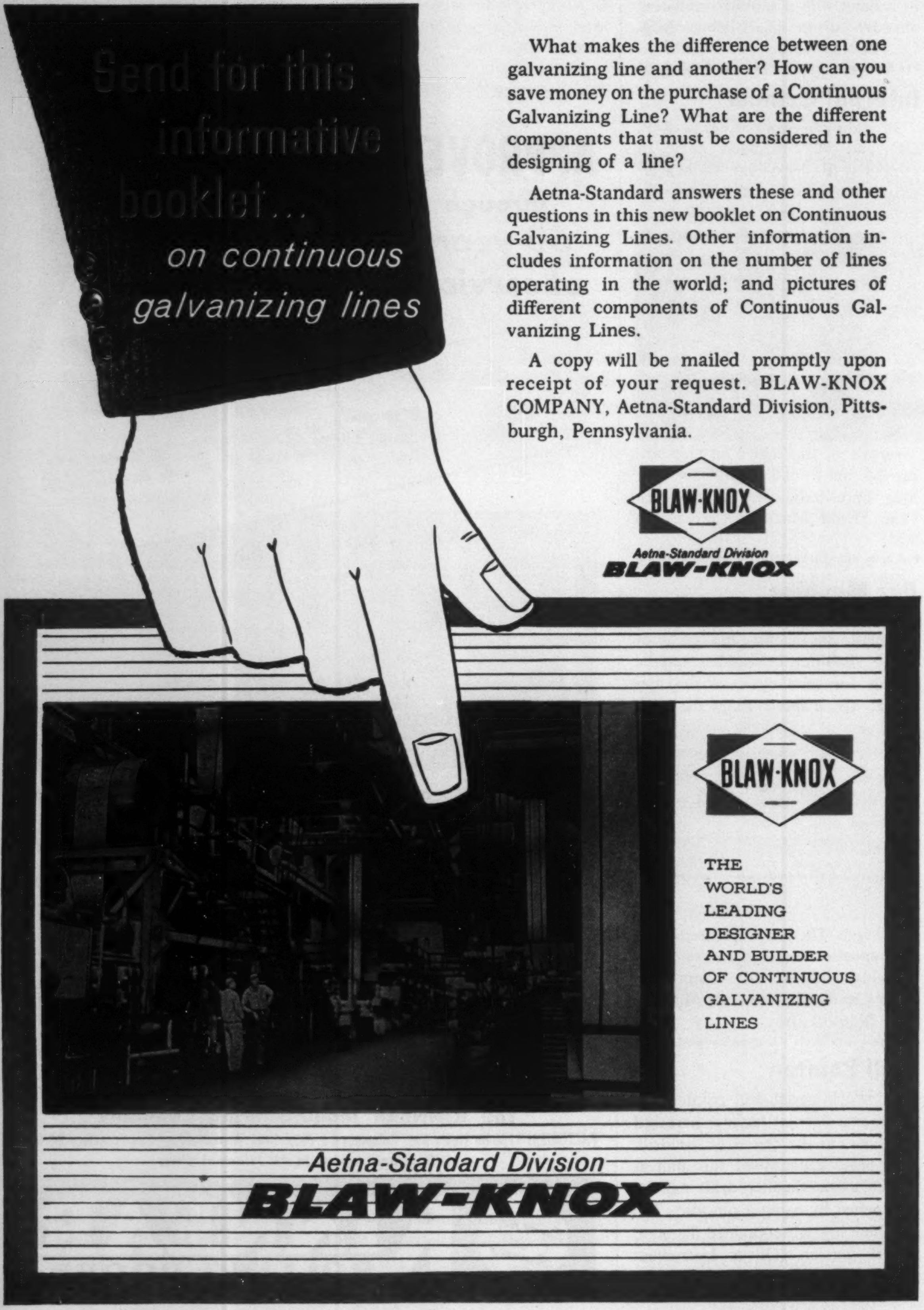
This is a Kinnear service that started before the turn of the century (when Kinnear *originated* the door with the interlocking-slat curtain).

You can be sure that, *at any time in the future,* correct replacement for any worn or damaged parts of any Kinnear Rolling Door will be available promptly.

In addition, Kinnear Rolling Doors save space . . . coil completely out of the way . . . clear the entire opening . . . remain out of reach of damage while opened . . . complement any building architecture . . . and assure all-metal protection against wind, weather, trespass or vandalism. Built to fit any opening, in new or old buildings. Power operated if desired. *Write for full details!*

The KINNEAR Manufacturing Company
FACTORIES: 1760-80 Fields Ave., Columbus 16, Ohio; 1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

Saving Ways in Doorways
KINNEAR
ROLLING DOORS


Send for this informative booklet...
on continuous galvanizing lines

What makes the difference between one galvanizing line and another? How can you save money on the purchase of a Continuous Galvanizing Line? What are the different components that must be considered in the designing of a line?

Aetna-Standard answers these and other questions in this new booklet on Continuous Galvanizing Lines. Other information includes information on the number of lines operating in the world; and pictures of different components of Continuous Galvanizing Lines.

A copy will be mailed promptly upon receipt of your request. BLAW-KNOX COMPANY, Aetna-Standard Division, Pittsburgh, Pennsylvania.

BLAW-KNOX

Aetna-Standard Division
BLAW-KNOX

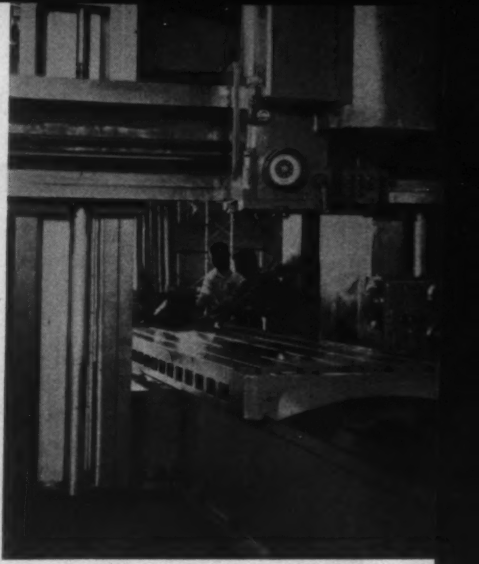
BLAW-KNOX

THE
WORLD'S
LEADING
DESIGNER
AND BUILDER
OF CONTINUOUS
GALVANIZING
LINES

Aetna-Standard Division
BLAW-KNOX

Machine Tool Exposition Previews:

Planing, Shaping, Broaching



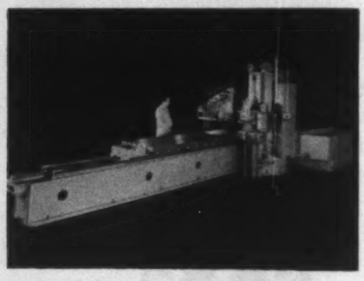
Squares Ends

A 15-ton, horizontal, hydraulic pull-type broaching machine squares the ends of bar stock of any length. It accommodates bars up to a maximum of 5¾ in. square. The broach, which is designed to run integrally with the fixture, removes a maximum of 0.064 in. per pass. A dial indicator, graduated into thousandths of an inch, determines the correct length of the part when squaring the second end. (The Lapointe Machine Tool Co., Booth 1229)

For more data circle No. 75 on postcard, p. 213

Shaper-Planer

Productive and maintenance-free, a shaper-planer has complete push-button control; 50-hp hydraulic unit, with 18,000 lb maximum cutting pressure. It also has a completely new table with much heavier cross and longitudinal ribbing to eliminate table distortion from improper clamping of the work piece and for better accuracy. The unit has an accessory which provides three traverse speeds for the heads, making it possible to position the tools to within 0.001 in. from the pendant. (Rockford Machine Tool Co., Booth 1001)



For more data circle No. 76 on postcard, p. 213

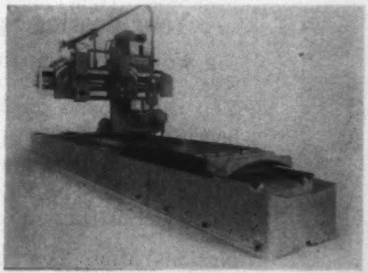
Gear Shaper

Designed to meet the needs of automation lines, a gear shaper has open-back two-column design which permits through-feed and reduces cycle times. Other design features have been added to increase accuracy and flexibility of operation. (Michigan Tool Co., Booth 950)

For more data circle No. 77 on postcard, p. 213

Metal Remover

It is possible to finish-plane at the same time while the planer is double-cut roughing. This means precision cuts may be made at high speed, without a tool change. This planer offers the most efficient economical method of metal removal for flat surface machining, at the highest possible speed. No elaborate grinding or gages are necessary. The double cutting tools are standard carbide tips held in simple holders. (The G. A. Gray Co., Booth 1350)



For more data circle No. 78 on postcard, p. 213

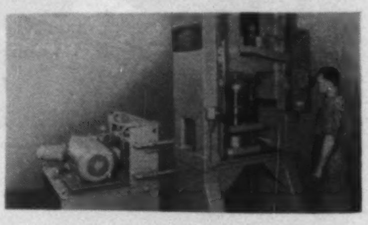
Gear Hobber

Running continuously, a gear hobbing machine has a simple automatic work-handling device. It consists of a chain magazine with supply studs and head with dual gripping devices which swivels 180° to load and unload the work. The gear blanks are placed on the supply studs and the chain magazine moves them to the loading position where the gripping devices load the blanks and remove the finished gears. The cut gears are placed on the same stud from which the blanks were removed. The work change occurs during the axial rapid traverse return. A single-start hob, running at about 380 fpm, is used and two gears are hobbed at the same time. (The Fellows Gear Shaper Co., Booth 929)

For more data circle No. 79 on postcard, p. 213

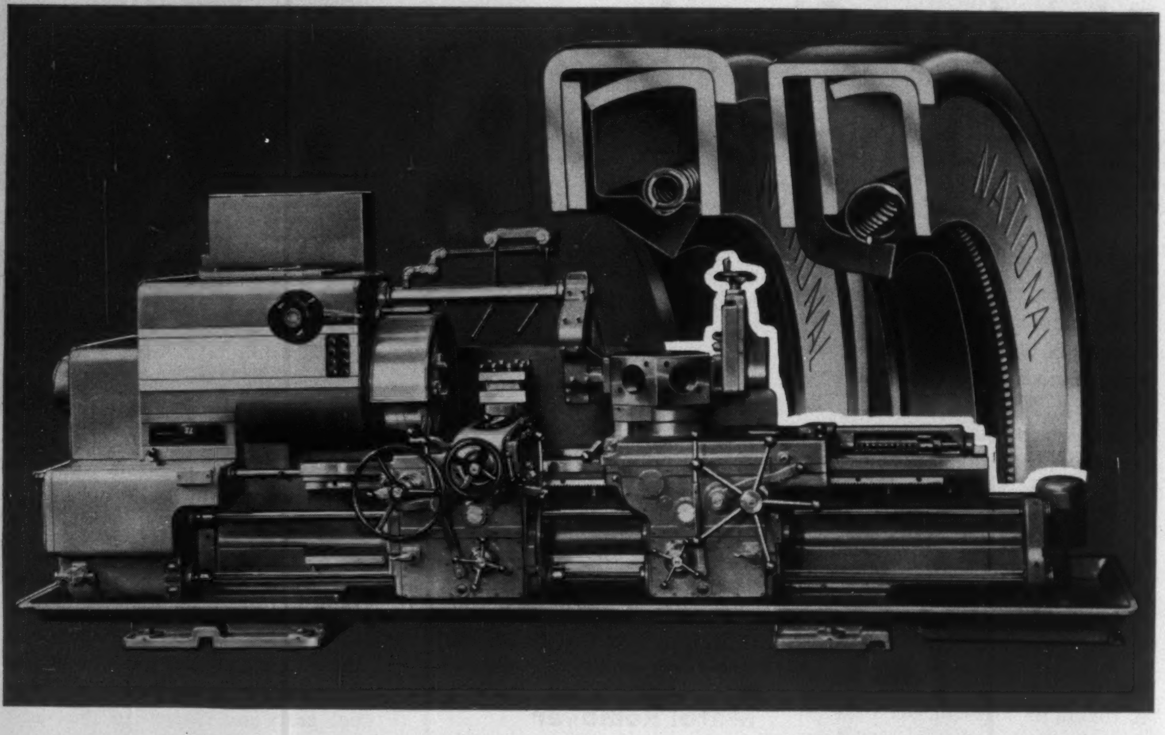
Broaching Machine

Occupying a floor space of about 51 x 42 in., a vertical hydraulic press-type broaching machine produces spur and helical gears and other toothed forms on the outside diameter of a part. The unit makes use of a one-piece broaching tool made in the form of an internal gear. This unit has a 20-hp motor and a 29-gpm pump. (National Broach & Machine Co., Booth 1430)

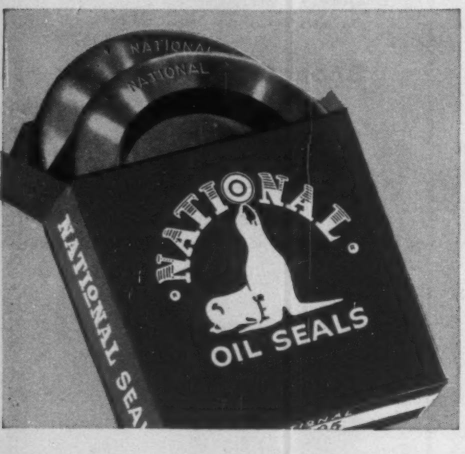


For more data circle No. 80 on postcard, p. 213

Better products, *faster,* from your Bearing Specialist:



Install National Oil Seals...low cost protection to keep machine output at peak levels



Your Bearing Specialist will help you set up a working stock to handle repair jobs in a hurry

You can depend on National Oil Seals to lengthen vital bearing life, cut downtime losses, and help hold production schedules. They're made to seal *in* lubricant, and seal *out* abrasive dirt. The key to this protection guarantee is the quality construction of every National Oil Seal.

National *Micro-Torc* Seals feature specially processed leather that stays flexible, lasts longer, and runs cooler. *Syntech* rubber seals are specially blended to meet exacting conditions of temperature, shaft speed, and other critical factors. Both types come in all sizes and are always available for fast delivery whenever you need them. Call your Bearing Specialist. He's nearby for ready help.

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE
DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

NATIONAL OIL SEALS

Machine Tool Exposition Previews:

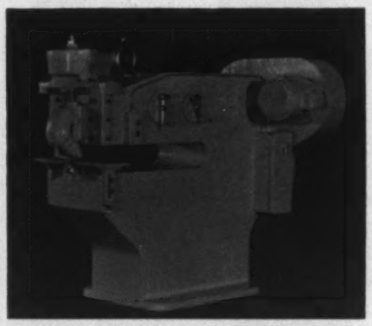
Pressworking

Smooth-Edge Blanking

Capable of up to 120 strokes per minute, a fully-hydraulic triple-action blanking press is equipped with special die. This die produces smooth-edge parts without any shaving operation. Burrs are greatly reduced. Parts, such as cams, may be used in assembly direct from the press. This new unit operates with automatic roll feed or strip stock. Metal thickness and type of metal may be changed without press adjustment. (The Hydraulic Press Mfg. Co., Booth 1011)

For more data circle No. 81 on postcard, p. 213

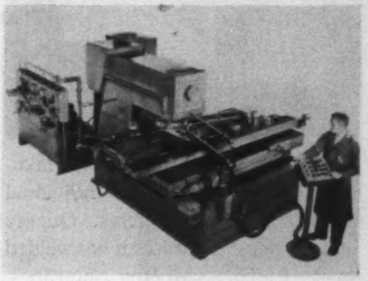
Rotary Shear



This machine is a weldment and has a shearing capacity of ¼-in. mild steel. The throat depth is 36-in. and there are three cutting speeds of 8, 14, and 20 fpm. The upper cutter head can be operated through a worm drive and hand wheel as shown, or a motorized drive can be substituted if the application or the customer's requirements indicate the need. (Beatty Machine & Mfg. Co., Booth 243)

For more data circle No. 82 on postcard, p. 213

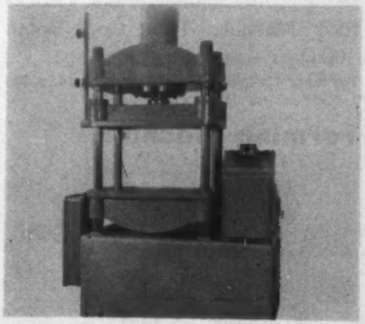
Punch Press



With numerical positioning control, a 15-ton capacity turret punch press locates and pierces holes automatically at the rate of 60 per minute — including tool changing. (Wiedemann Machine Co., Booth 1249)

For more data circle No. 83 on postcard, p. 213

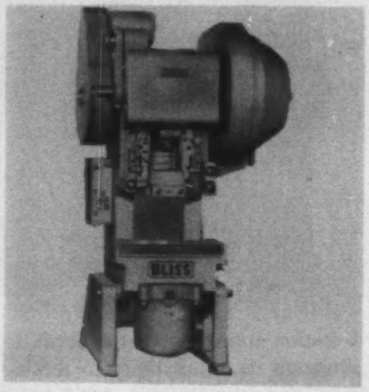
General-Purpose Press



A general-purpose, guided platen 40-ton hydraulic press can form, bend, mold, and do many other applications. (Greenerd Arbor Press Co., Booth 541)

For more data circle No. 84 on postcard, p. 213

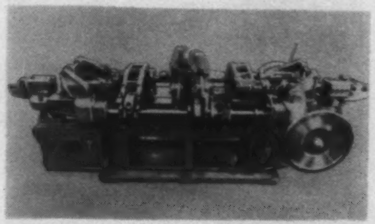
Inclinable Presses



Inclinable presses offer enlarged dimensions and specifications that give them measurable advantages over previous models. Most important among the presses' new features is their modern cast Meehanite frames. They reduce deflection at full tonnage, increase dimensions in bed and die areas, and thus provide heavy load-bearing working parts. The presses come in four tonnages—22, 35, 45 and 60. (E. W. Bliss Co., Booth 1325)

For more data circle No. 85 on postcard, p. 213

Produces Stampings

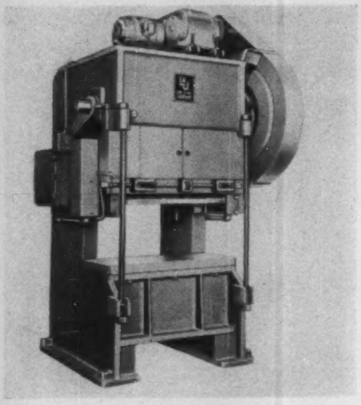


For the automatic production of precision-formed stampings, a double-ended machine receives material (stock from coils) at both ends; one strip feeding in the left to right direction and the other in the right to left direction. This arrangement is ideally suited for the fabrication of assemblies, which could include two stampings (both made and assembled in the machine) or two stampings (both produced in the machine) assembled with a prefabricated, hopper-fed member. Also, the equipment can be used for making two entirely different stampings (not requiring assembly) at the same time. (U. S. Tool Co., Inc., Booth 842)

For more data circle No. 86 on postcard, p. 213

Gap Frame Press

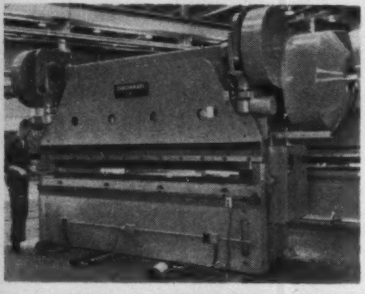
Designed specifically for handling large dies and wide stock, a gap frame press will be exhibited with 8-station transfer and roll feeds to illustrate its adaptability to tooling requirements. It is of the double-crank type and is equipped with an air clutch. The frame and box slide are of heavy, welded construction. (L & J Press Corp., Booth 1116)



For more data circle No. 87 on postcard, p. 213

Press Brake

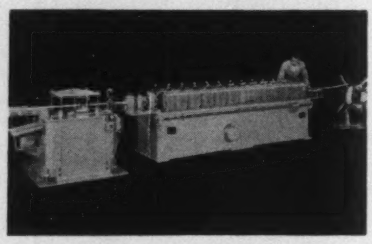
Equipped with automatic cycle, 225/150 tons bending capacity, a press brake machine illustrates the first real solution to slow-speed bending action with high-speed cycling of the press brake ram. A smooth, even flow of power produces the same bend with each repetitive stroke of the ram without troublesome "back-bends" or "whip-up" of the sheet's free end. (The Cincinnati Shaper Co., Booth 1230)



For more data circle No. 88 on postcard, p. 213

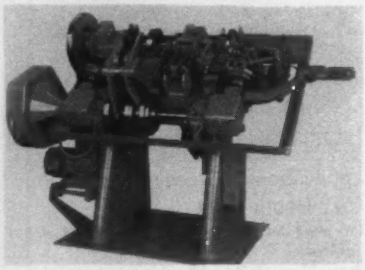
Roll-Forming Machine

A roll-forming machine has magnetic starter, two push-button stations; full-length jog bar, direct chain drive with double power take-off; micrometer dial-type individual upper spindle adjustments. Quality built of finest materials, it has welded steel frame, cast-iron housings, steel-cut heat-treated gears, hardened and ground spindles. Other features include: 40-120 fpm forming speeds; 12 forming stations; 4-5-in. vertical distance between spindles; 10-in. horizontal distance between spindles; 5-hp, 3-phase, 220/440 v, 60-cycle, variable-speed motor with holding brake. (Rockford Machine Tool Co., Booth 1001)



For more data circle No. 89 on postcard, p. 213

Forming Machine

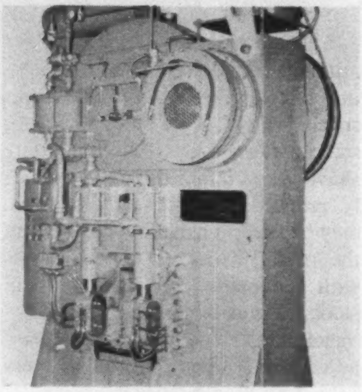


An inclinable ribbon-metal and wire-stock forming machine can operate from a horizontal (0°) position to a vertical (90°) position. Its flexibility and versatility affords considerable time saving in tool set-up and maintenance. It will form and eject parts without restriction due to its operating angle and can be utilized with automatic receiving equipment, including conveyor, rotary table stacking units. Safety guard railing surrounds the machine, form bracket provides two vertical motions, scrap from press is ejected through bolster opening. (The Baird Machine Co., Booth 1142)

For more data circle No. 90 on postcard, p. 213

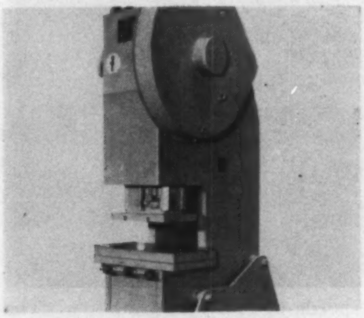
Billet Shear

Offering many advanced features, a billet shear provides continuous service in production cutting. It functions continuously at full capacity (within its rating) on any shearable material. Ram tonnage of the new shear is 400 tons. It operates at speeds up to 60 strokes per minute (free running); handles square billets up to 4-in. sq.; rounds up to 4½-in. diam, flat bars up to 12 x 2 in. Machine stroke is 2 in. (Buffalo Forge Co., Booth 551)



For more data circle No. 91 on postcard, p. 213

Single-Geared Press

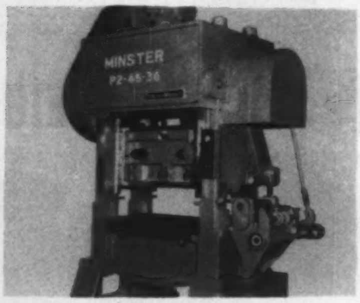


Of all-steel construction, a mechanical press offers many outstanding time-saving features. The frame is constructed of welded rolled steel plate with heavy cross ribbing fully stress relieved. Dependable, accurate alignment of the box type slide is maintained through formica lined gibs and long gib ways. Fully guided, large diameter, long barrel type adjusting screw and pneumatically balanced slide makes the slide adjustment from the floor level quick and easy. (Ferracute Machine Co., Booth 1122)

For more data circle No. 92 on postcard, p. 213

Straight-Side Presses

Precision built for progressive die operations at high speeds, automatic production two-point straight side presses feature exceptional slide guiding and slide to bed parallelism. Shock-mounted press control, air manifold and lubrication distribution blocks are located in cabinet enclosures in the press crown. This press is equipped with a continuous recirculating oil lubrication system. Flywheel brake is electrically interlocked with the drive stop circuit. (Minster Machine Co., Booth 1339)



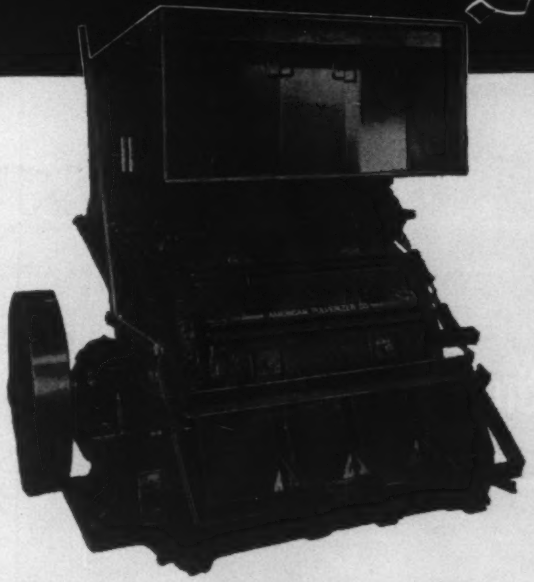
For more data circle No. 93 on postcard, p. 213

Hydraulic Press

For the stamping industry, a 25-ton hydraulic press is capable of delivering over 600 ram strokes per minute. Designed for high speed progressive stamping operations, the new unit is a vertical frame, four-column design platen press, equipped with a roll feed, stock oiler and variable-speed straightener. Bed area between guide posts is 20 x 20 in. (American Brake Shoe Co., Booth 914)

For more data circle No. 94 on postcard, p. 213

Here's A Curly Cue
To New Market Value
For Your Machine Turnings



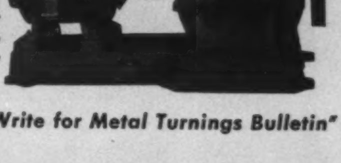
American METAL TURNINGS Crusher

That single machine turning of curled-up steel shown above can be mighty troublesome and costly to your operations.

Gnarled up with thousands of others like itself, it becomes a problem in space . . . gallons of re-usable cutting oil are trapped in the folds . . . and the scrap value is greatly minimized.

Answer? Run this tangled waste through an efficient, AMERICAN METAL TURNINGS CRUSHER. Out come sized chips that are easy to handle for shoveling or pneumatic handling . . . easy to store (savings in space up to 75%) . . . easy to spin for oil recovery . . . and crushed turnings command a higher price.

The cost is easy, too, on your scrap recovery program. Pays for itself.

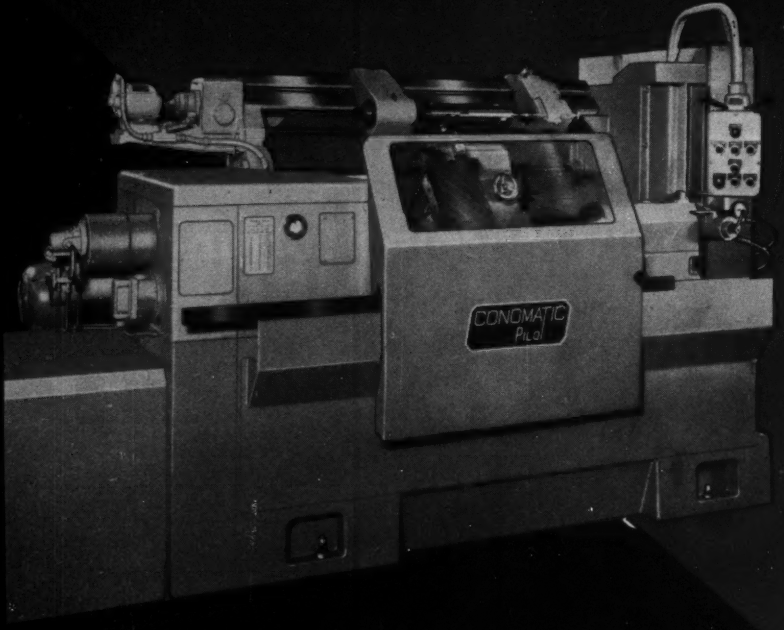


RECLAIM FUSED WELDING FLUX
American Hammermill reduces fused flux to fine regranulation for perfect re-use. Why throw away profits! Details on request.

"Write for Metal Turnings Bulletin"

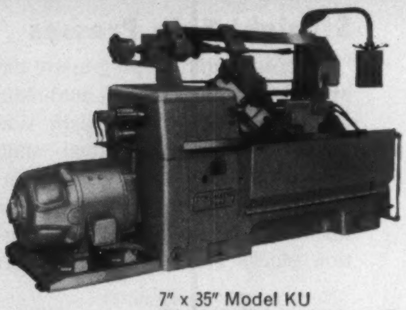
American
PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
1439 MACKLIND AVE. SAINT LOUIS 10, MISSOURI

A CORDIAL



The CONOMATIC PILOT
10″ x 35″ Model KU

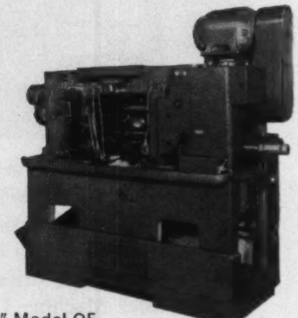
An economical, efficient, fully automatic copying lathe. Produces a variety of work with great accuracy and exceptionally good finish.



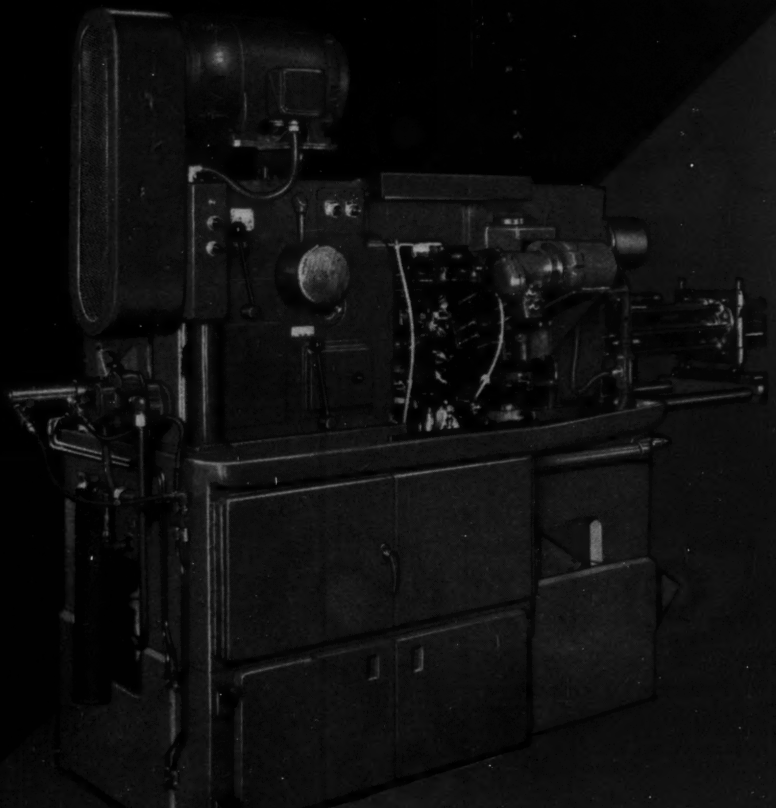
7″ x 35″ Model KU
CONOMATIC PILOT LATHE

See these TWO at CHICAGO!

...see all EIGHT



9/16″ Model QE
CONOMATIC (with
Magazine Feed)



The Model QF 9/16″
6-Spindle BAR CONOMATIC

Designed to give better accommodation, support and maintenance to tools and work up to 9/16″ dia.

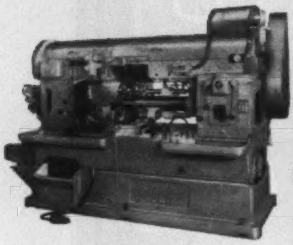
MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

BOOTH NO. 1215

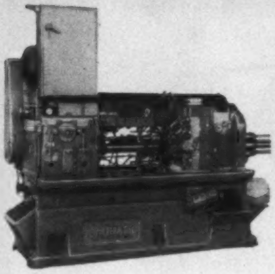
INVITATION FROM CONE AUTOMATIC...

You will be most warmly welcome at the CONE Booth, No. 1215, NMTBA Exposition, Chicago Amphitheatre, September 6-16. Here, you will see thoroughly demonstrated the profitable production features of two outstanding CONOMATICS.

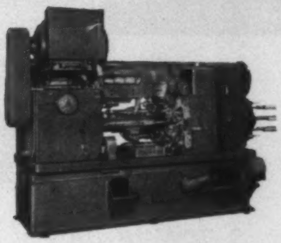
Although these machines excel in the ranges of work for which they are designed, they are only a token representation of the quality and depth of machining service provided by the entire CONOMATIC line.



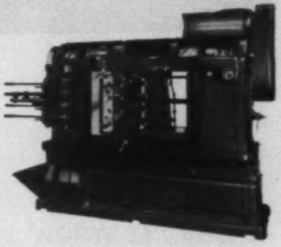
5⅞" Model TE
CONOMATIC



1" Model TS Bar
CONOMATIC



1⅝" Model TF Bar
CONOMATIC



1½" Model DP 4-HI Bar
CONOMATIC

CONOMATICS in action at the permanent display at WINDSOR

The home of CONE AUTOMATIC MACHINE CO., INC., at Windsor, Vermont

For those whose interests require more deliberation for machine analysis and comparison than the conditions at a large equipment show permit, Cone — at its Windsor, Vermont plant — has prepared a permanent type of CONOMATIC Exhibit that more completely presents all of the top features of the "World's Most Productive Line of Automatics". Here, you may see in action the capabilities of a single model, or a group of models, and minutely examine them in the light of your own specific requirements.

Cone will be delighted to supply travel information, and arrange for comfortable accommodations.

Conomatic

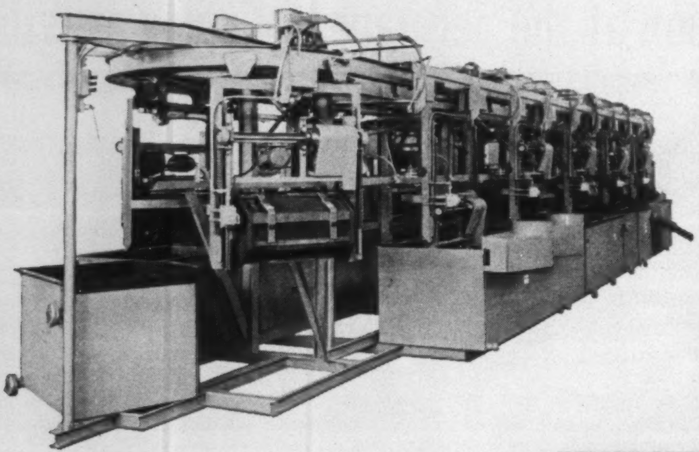
CONE AUTOMATIC MACHINE COMPANY, INC.
Windsor, Vermont

KEEP UP-TO-DATE WITH UDYLITE!

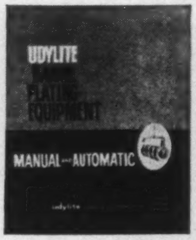
world's
largest
plating
supplier

udylite

It pays to know what's new in barrel plating equipment
. . . from economical, field-repairable cylinders
. . . to high-production automatic machines.



THIS NEW UDYLITE CATALOG is packed with valuable information on the latest manual and automatic barrel plating equipment, designed and built by Udylite to help you boost your plating profit potential. Bring yourself up-to-date; write for your free copy today!



the udylite corporation • detroit 11, michigan

on the west coast: L. H. Butcher Co.

Navy Pier Houses Exhibit Valued at $10 Million

■ Automation, the key to manufacturing during the 1960s, will be the theme of more than 250 exhibitors at the Production Engineering Show.

The huge exposition, twice the size of the one held five years ago, will cover both sections of Chicago's $10 million Navy Pier and will run concurrently with the Machine Tool Exposition at the International Amphitheatre, Sept. 6 through 16.

The exhibit at the Navy Pier will show the equipment and products which keep machine tools running. Control equipment of every conceivable type, machine components, auxiliary equipment and supplies, intraplant communications, safety equipment, materials handling equipment, inspection and gauging equipment, testing equipment, and dozens of types of special production equipment will not only be shown but demonstrated under simulated factory conditions.

Held Every Five Years — The 125,000 expected visitors will thus have an opportunity to see the machine tools in operation at the International Amphitheatre and see the equipment which makes the tools run—and maintains them—at Navy Pier.

The physical separation of the two shows was made necessary because there is no exposition hall in the country which can house them both. Because they are held only twice in each decade, top executives from every civilized country converge on Chicago to see the exhibits.

The same badge and the same registration fee will admit the visitor to both shows. Buses will run from hotels to both the Navy Pier and the International Amphitheatre, as well as back and forth between the two halls.

Many of the controls and other auxiliary equipment exhibited at the Production Engineering Show will be used by exhibitors at the Machine Tool Show to keep the machine tools running there. Thus, visitors will be able to inspect the equipment at Navy Pier and see how it works when attached to huge machine tools at the International Amphitheatre.

Production Engineering Show

September 6-16

1 to 10 pm

(Except Sunday)

List of Exhibitors

Exhibitor	Booth
A & A Mfg. Co., Inc.	481
Acco Equipment Div.	361
ACF Electronics Div., ACF Industries, Inc.	610
Adamas Carbide Corp.	153
Amp, Inc.	535
Acro Div. Robertshaw-Fulton Controls Co.	306
Advance Products Corp.	300
Airmatic Valve, Inc.	483
Alemite Div. Stewart-Warner Corp.	251
Allen-Bradley Co.	216
The Louis Allis Co.	127
Aloris Tool Co.	470
American Electronics, Inc.	604
American Metal Forming Co.	462
American Screw Co.	526
American Sealants Co.	480
Arcair Co.	460
Armstrong Bros. Tool Co.	238
Arrow-Hart & Hegeman Electric Co.	267
Associated Spring Corp.	204
Associated American Winding Machine Co.	516
Atkins Saw Div., Borg-Warner Corp.	326
Automatic Switch Co.	132
Balcrank, Inc., Machine Tool Div.	304
Barry Controls, Inc.	387
Beaver Pipe Tools, Inc.	141
Bendix Corp.	530
G. S. Blakeslee & Co.	330
Boeing Airplane Co.	528
Boston Gear Works	123
Breuer Electric Mfg. Co.	423
Bristol Co.	407
Brook Motor Corp.	601
Browning Mfg. Co.	252
Buchanan Electrical Products Corp.	507
Buck Tool Co.	244
C. I. T. Corp.	210
Camloc Div.	427
Casting Engineers Div., Consolidated Foundries & Mfg. Corp.	457
Chicago Powdered Metal Products Co.	429
Chicago Rivet & Machine Co.	236
Chicago Tool & Engineering Co.	523
Chicago Wheel & Mfg. Co.	383
Clark Controller Co.	137
Clark, Cutler and McDermott	227
Cogsdill Tool Products, Inc.	515
Collins Microflat Co.	424
Commander Mfg. Co.	321
Consolidated Kinetics Corp.	622
Copy-Craft, Inc.	258
Counter & Control Corp.	478
Arthur A. Crafts Co.	454
Cramer Controls Corp.	456
Walter Cronan Co.	472
Crown Tool, Inc.	443
Crucible Steel Co. of America	307
Cuno Engineering Corp.	359
Curtiss-Wright Corp.	378
Cushman Chuck Co.	128
Cutler-Hammer, Inc.	142
Dake Corp.	211
Dazor Mfg. Corp.	256
Delco Products, Div.	223
Deluxe Coils, Inc.	441
R. B. Denison Mfg. Co.	406
De Van-Johnson Co.	477
Devcon Corp.	230
DeVilbiss Co.	336
DeVry Technical Institute	607

(continued on p. 238)

(continued from p. 237)

Die-Draulic Grip, Inc. 264
Diehl Mfg. Co. 136
DoAll Co. 116
Durant Mfg. Co. 302

Eagle Signal Co. 381
Eclipse Machine Div., The Bendix Corp. 614
Eldridge Co. 234
Electro Dynamic Div., General Dynamics Corp. 606
Empire Corp. 379
Enco Mfg. Co. 468
Encyclopaedia Britannica 335
Engineered Electronics Co. 363
Engis Equipment Co. 467
Ettco Tool & Machine Co. 247

FAC Div., Overseas Commodex, Inc... 525
Fafnir Bearing Co. 217
Fairbanks, Morse & Co. 350
Farrand Controls, Inc. 103
Farrington Mfg. Co. 209
Fawick Airflex Co., Inc. 224
Federal Bearings Co., Inc. 310
Federal Pacific Electric Co. 445
Felters Co. 359
Fenway Machine Co., Inc. 437
Ferguson Machine Corp. 246
Field Abrasive Mfg. Co. 500
Florida Development Commission 208
Formsprag Co. 325
Friden, Inc. 334
Furnas Electric Co. 511

Gaertner Scientific Corp. 346
Gast Mfg. Corp. 512
General Automation Corp. 521
General Electric Co. 110
General Radio Co. 630
Gilman Engineering & Mfg. Co. 205
Graflex Corp. 339
Graham Transmissions, Inc. 303
Green Instrument Co. 320

Hamilton Co. 154
Hammond Machinery Builders, Inc. 432
F. Ward Harman Associates 318
Haydon Div., General Time Corp. 348
Hevi-Duty Electric Co. 368
Hitchiner Mfg. Co., Inc. 349
Hoffman Engineering Corp. 408
Holo-Krome Screw Corp. 165
Hyatt Bearings Div., G.M.C. 433

Ideal Industries, Inc. 419
Imperial Brass Mfg. Co. 450
Imperial Stamp & Engraving Co. 140
Industrial Coils, Inc. 520
Industrial East Co. 458
Inspection Control Corp. 624
International Business Machines Corp.. 428

Jacobs Mfg. Co. 113
Janette Electric Mfg. Co. 324
Jerico, Inc. 203
Jiffy Disintegrators, Inc. 493

Kellems Co., Inc. 626
Kennametal, Inc. 111
Keystone Mfg. Co. 353
Korfund Co. 506

La Salle Steel Co. 147
Lear, Incorporated 611
Lempco Industrial, Inc. 362
Lima Electric Motor Co. 215
Lindbergh Engineering Co. 225
Lowell Industries, Inc. 333
Lubriquipment Engineers, Inc. 475
Lufkin Rule Co. 426
Luxo Lamp Corp. 605

MB Electronics Div., Textron Electronics, Inc. 504
Machinery Electrification, Inc. 459
MacRae's Blue Book 341
Magnaflux Corp. 400
Manheim Mfg. and Belting Co. 476
Marathon Electric Mfg. Corp. 249
Marlin-Rockwell Corp. 125
Martin Engineering Co. 371
Marvel Engineering Co. 253
May-Fran Engineering, Inc. 455
McGill Mfg. Co. 213
Metal Removal Co. 600
Micro-Poise Engineering & Sales Co. 145
Micrometrical Mfg. Co. 418
Micro Switch, Div. Minneapolis-Honeywell 271
Miller Fluid Power Co. 106
Mo-Bar Hydraulic Sales Co. 308
Modern Mfg. Co., Inc. 328
Moog Servocontrols, Inc. 206
Morrison Machinery and Engineering Co. 402

National Diamond Lab., Inc. 299
National Equipment Rental Ltd. 479
New Departure Div., G.M.C. 133
New Hermes Engraving Machine Corp. 431
New Method Steel Stamps, Inc. 257
L. Newman Tool, Die & Machine Works 487
Nichols-Morris Corp. 503
Norden Div., United Aircraft Corp. 221
North Electric Co. 385
Northwestern Tools, Inc. 416
Nylock Corp. 474

O'Neil-Irwin Mfg. Co. 259
Onsrud Cutter Mfg. Co. 501
Opto-Metric Tools, Inc. 412
The Osborn Mfg. Co. 375
Owatona Tool Co. 435
Ozalid Div., General Aniline & Film Corp. 491

Paramount Textile Machinery Co. 602
Parker-Kalon 489
Parker Pen Co. 205
Perrysburg Tool Service, Inc. 472
Phillips Mfg. Co. 438
Pines Engineering Co., Inc. 266
Pivot Punch & Die Corp. 201
Plan Hold Corp. 369
Portage Double Quick, Inc. 358
Precise Products Corp. 625
Productive Equipment Corp. 514
Production Machine Co. 410
PurOlator Products, Inc. 405

Redin Production Machine Co. 143
Reliance Electric & Engineering Co.... 411
J. A. Richards Co. 305
Roller Bearing Co. 117

Ross Operating Valve Co. 220
Rowe Machinery & Mfg. Co. 166
RoyEl Tools 508
Ruthman Machinery Co. 376

Safety Socket Screw Co. 403
Saginaw Steering Gear Div., G.M.C... 104
Sargent and Co. 505
Schauer Mfg. Corp. 322
Scherr-Tumico Chicago Co. 356
Geo. T. Schmidt, Inc. 233
Scully-Jones and Co. 229
Sheldon Machine Co. 240
Sigmamotor, Inc. 404
Skinner Chuck Co. 212
Skinner Electric Valve Div. 212
A. O. Smith Corp. 239
Sola Electric Co. 373
Space Components Inc. 269
Specialties, Inc. 419
Spiral Step Tool Co. 262
Square D Co. 100
Stahlin Bros., Inc. 345
Standard Oil Co., Indiana 471
Standard Pressed Steel Co. 232
L. S. Starrett Co. 150
Stewart-Warner Corp. 465
Sunnen Service Corp. 327
Supreme Products Corp. 226
Sumitomo Shoji Kaisha, Ltd. 609
Synthane Corp. 163

Tap Cartridge Co. 329
Tapmatic Corp. 157
Tecnica Corp. 510
G. H. Tennant Co. 160
Texas Instruments, Inc. 374
Timken Roller Bearing Co. 314
Toledo Scale Div., Ohio 219
Torit Mfg. Co. 401
Trabon Engineering Corp. 155
Troyke Mfg. Co. 442
Tru-Seal Div., Flick-Reedy Corp. 106
Tubular Rivet & Stud Co. 449

Union Mfg. Co. 365
U. S.-Burke Machine Tool Div. 241
U. S. Electrical Motors, Inc. 159
United States Leasing Corp. 312
United States Rubber Co. 119

Valenite Metals, Div. Valeron Corp. ... 627
Vascoloy-Ramet Corp. 124
Vickers, Inc. 107

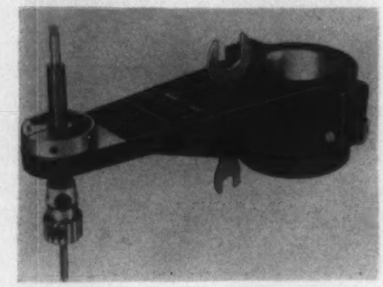
E. H. Wachs Co. 347
Wagner Electric Corp. 260
Wales Strippit, Inc. 340
Wang Laboratories, Inc. 509
Warner Electric Brake & Clutch Co. .. 444
Watts Regulator Co. 355
Wedin Corp. 624
Welduction Corp. 237
Weltronic Co. 464
Wesco Tool, Inc. 485
Westinghouse Air Brake Co. 301
Westinghouse Electric Corp. 101
Wilson Mechanical Instrument 361
Wilton Tool Mfg. Co., Ill. 421

Zenith Electric Co. 527
Zero-Max Co. 250

Production Engineering Show Previews

Tapping Attachments

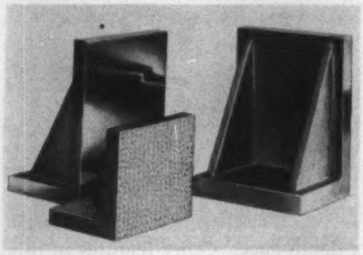
Lead-screw tapping attachments, which fasten to round column-drill presses, can be used with any reversing-type head. They convert drill presses into precision tapping machines. These units enable operators—even with no special skills—to precision tap holes on piece after piece. And there is no danger of thread damage. (Ettco Tool & Machine Co., Booth 247)



For more data circle No. 130 on postcard, p. 213

Granite Parallels

Utilizing the advantages of black granite in their new accessory line, a manufacturer will exhibit granite-box parallels. This new parallel-straight-edge 90° angle side is a real money-saving shop tool. Also to be featured are precision metal-surface plate accessories, V-blocks, universal right-angle irons and slotted-angle plates. (Collins Microflat Co., Booth 424)



For more data circle No. 131 on postcard, p. 213

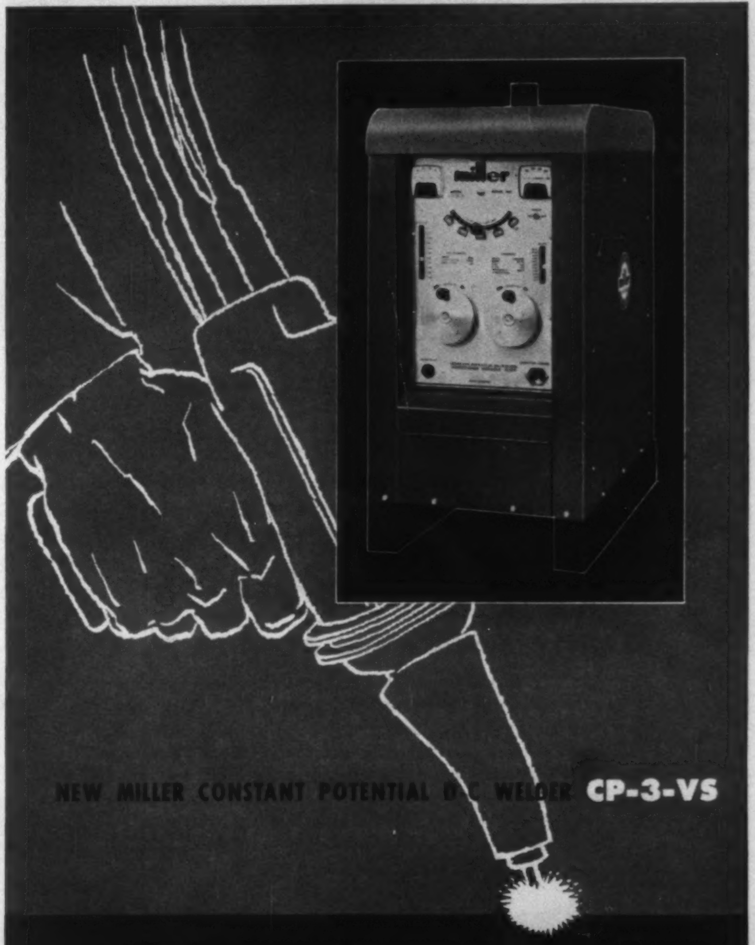
Numerical Positioning

A compact, solid-state unit, occupying only 6 sq ft of floor space incorporates a mechanical tape reader that uses standard 8-channel binary-coded decimal paper or plastic tape. Ten auxiliary functions may be programmed in addition to dimensional data, using standard flexowriter codes. (Bendix Corp., Booth 530)

For more data circle No. 132 on postcard, p. 213

Automated Lathes

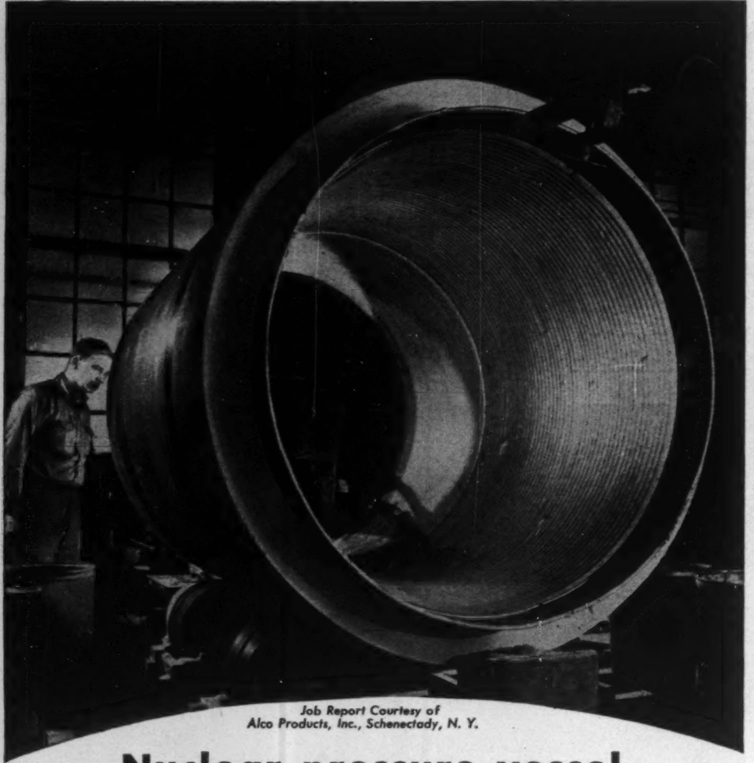
Heavy-duty "speed lathes" designed for 24-hour operation feature timed operation sequences where time off, time on, opening or closing of the work-holding fixture and selection of spindle speeds can be controlled in proper sequence—either automatically or manually. Also exhibited will be two-speed, 1-hp speed lathes for either bench or pedestal mounting. The latter


miller
NEW MILLER CONSTANT POTENTIAL D.C. WELDER CP-3-VS

X-ray perfect MIG welds on aluminum, magnesium, stainless and carbon steel sheets down to .030" are the routine result with the New Miller Constant Potential, CP-3-VS. Continuous slope and voltage adjustment even during the course of the weld means that the operator is able to "tune in" the desired settings. There's no burn-through; there's no spatter. Actually, a new performance high in low voltage welding is established with the introduction of this welder with its broad range of from 300 amps at 30v to 25 amps at 10v. • Complete specifications, as well as recommendations for your particular application problems, will be sent promptly upon request.

miller ELECTRIC MANUFACTURING CO., INC., APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal



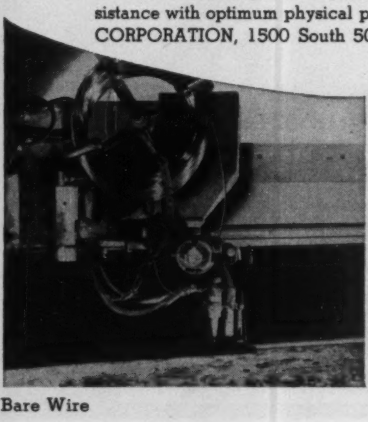
Job Report Courtesy of
Alco Products, Inc., Schenectady, N. Y.

Nuclear pressure vessel stainless clad at low cost

USE ARCOS

STAINLESS WIRE and BONDED FLUX

This "barrel" is one of several that comprise a nuclear pressurizer to operate under highly corrosive conditions. To reduce costs, Alco Products forged the shell of ASME A-336, 2—4 inch thick manganese molybdenum steel and clad the inside with stainless. The illustration shows the second pass overlay which was made by submerged arc using Arcos Chromenar K-LC (Type 308) bare wire and Arcosite S4 flux. Lower cost, and high corrosion resistance with optimum physical properties were obtained. ARCOS CORPORATION, 1500 South 50th St., Philadelphia 43, Pa.



Bare Wire

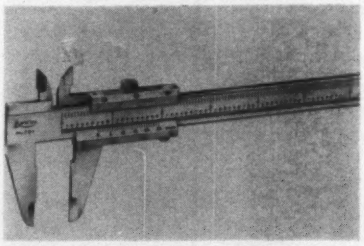
Arcosite Flux

can be equipped with collets, expanding mandrels, air chucks, vacuum chucks, magnetic chucks and other types of holding fixtures for parts of irregular contour. (Schauer Mfg. Co., Booth 322)

For more data circle No. 133 on postcard, p. 213

Vernier Caliper

An adjustable vernier plate that can be reset to compensate for wear and resurfacing of measuring faces extends the life of a new vernier caliper. It's a versatile tool for shop work. It makes inside, outside and root measurements of gears and threads—and can even be used as a depth gage. Other features of this new vernier caliper are the knurled pusher knob and the conveniently located thumb-screw lock. Measuring faces are ground and lapped for maximum accuracy. The overall length is 8-13/16 in. (Lufkin Rule Co., Booth 426)



For more data circle No. 134 on postcard, p. 213

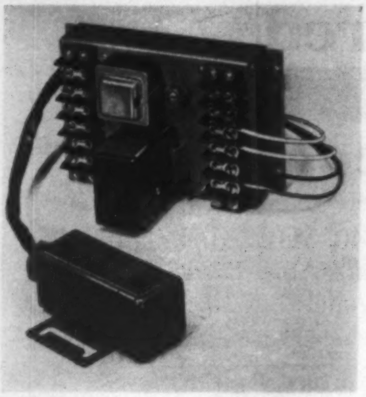
Test Unit

A standard—magnetic particle—unit is specially tooled with loading tray, positioning fixture, bath applicator, and automatic magnetizing circuit for production testing of ferrous parts up to 24 in. long. Suspended magnetizing heads and coil permit conveyors to be positioned either across or through the unit. (Magnaflux Corp., Booth 400)

For more data circle No. 135 on postcard, p. 213

Proximity Switch

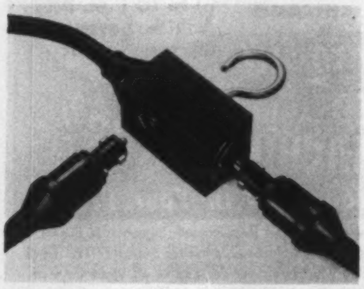
Consisting of a sensor and a separate transistor-amplifier, a proximity switch provides a plug-in relay. This sensor detects magnetic material without physical contact. It feeds an electrical output to a remotely located bi-stable amplifier. The amplifier operates the double-pole double-throw relay, which is wired to the circuit in the same manner as a conventional limit switch. The two components of this unit may be located up to 150 ft apart—without the use of shielded wire. (Micro Switch Div., Minneapolis-Honeywell Regulator Co., Booth 271)

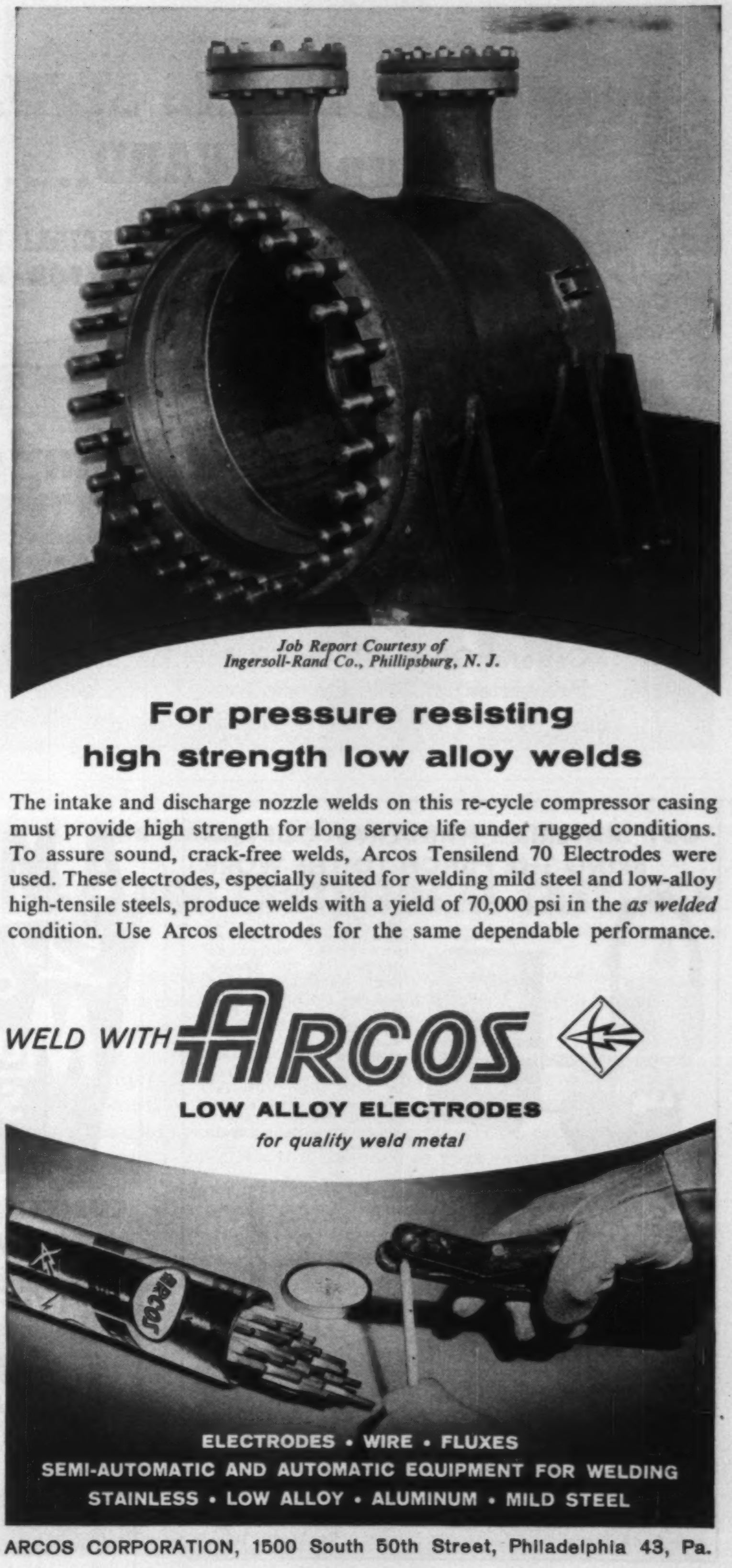


For more data circle No. 136 on postcard, p. 213

Cam-Locking Action

Special connectors employ a patented cam-action locking principle, which affords fast connections without tools. At the same time these connectors insure a positive lock, high-pressure contact, with maxi-





Job Report Courtesy of
Ingersoll-Rand Co., Phillipsburg, N. J.

For pressure resisting
high strength low alloy welds

The intake and discharge nozzle welds on this re-cycle compressor casing must provide high strength for long service life under rugged conditions. To assure sound, crack-free welds, Arcos Tensilend 70 Electrodes were used. These electrodes, especially suited for welding mild steel and low-alloy high-tensile steels, produce welds with a yield of 70,000 psi in the *as welded* condition. Use Arcos electrodes for the same dependable performance.

WELD WITH ARCOS
LOW ALLOY ELECTRODES
for quality weld metal

ELECTRODES • WIRE • FLUXES
SEMI-AUTOMATIC AND AUTOMATIC EQUIPMENT FOR WELDING
STAINLESS • LOW ALLOY • ALUMINUM • MILD STEEL

ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

People with SPRING STEEL problems turn to WARD......

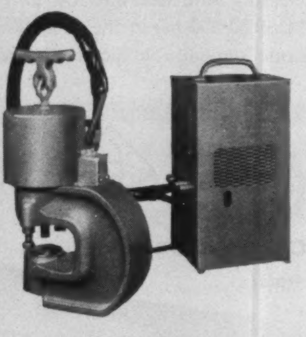
SPECIALIST IN SPRING STEEL
FOR OVER 50 YEARS

WARD
BlueTempered
ANNEALED
Spring Steel

WARD
STEEL CO.

General Office: 87 Rindge Ave. Ext., Cambridge 40, Mass. UN 4-2460
Branches: 60 Old Colony Ave., South Boston, Mass. AN 8-1264
3042-58 W. 51st St., Chicago, Ill. GRovehill 6-2600

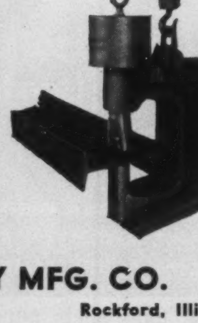
CUT MATERIAL HANDLING COSTS— BRING THE PUNCH TO THE WORK



The picture illustrates the #730 Portable Hydraulically powered punch for punching flanges of "I" beams, angle iron, channel iron and flat stock. Punching unit weighs 70 lbs. Power unit, ½ h.p., weighs 20 lbs. 30 ton capacity — 1 1/16" hole thru 5/16" mild steel, or 9/16" hole thru ⅝" mild steel. Easily suspended from overhead crane. Available from 5 to 90 ton.

No. 771 Punch

Capacity—70 tons. 7¾" depth of throat. 1 1/16" hole thru ¾" mild steel, or 13/16" thru 1" mild steel.
Designed for punching webs of "I" beams and channels, the flanges of angle iron, and flat stock. Furnished with either a 3 or 10 h.p. power unit, mounted on casters and easily rolled to the work. Supplied with 12' of hose that separates the punch from the power unit. Can be furnished with up to 60' of hose. Punch weight is 560 lbs. and it, too, is easily suspended from overhead crane.
This series available from 20 to 90 ton.



W. A. WHITNEY MFG. CO.

628 Race Street Rockford, Illinois

A MUST! for every MACHINERY USER

2nd INTERNATIONAL
COLISEUM
Machinery
SHOW

SEPT.
7th - 15th
1960
1 to 10 P.M. Daily
NOT OPEN
SUN., SEPT. 11

COLISEUM 1513 So. Wabash Ave. CHICAGO

THE SHOW TO SEE!
IMPORTED AND AMERICAN MACHINERY
To Effect Economies in Your Plant

Phone:
RIchmond
9-5071

Officers, Trustees, Department Supervisors, Buyers and all Plant Employees . . . WRITE FOR INVITATIONS entitling you to register for any or all eight days of this GREAT MACHINERY CLASSIC to:

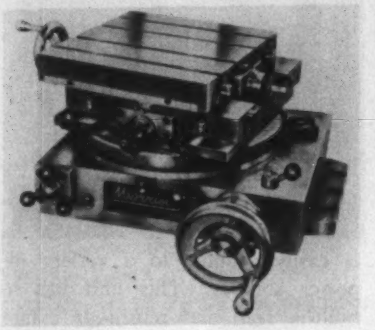
A. BYRON PERKINS & ASSOCIATES, Inc.
2216 So. Hill St., Los Angeles 7

mum conductivity and minimum resistance. The newest development in this area is an explosion-proof line of receptacles, connectors and distribution blocks for one, two, four, or six plugs. It features an air- and water-tight connection that is not energized until the plug is twisted and locked in the receptacle. (Cam-Lok Div., Empire Products, Inc., Booth 427)

For more data circle No. 137 on postcard, p. 213

Cross-Slide Tables

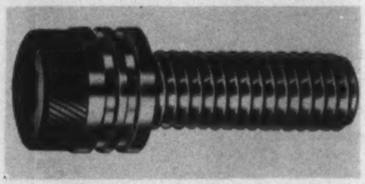
Cross-slide rotary tables are rugged, high-precision tools, designed to reduce set-up time of stamping, forging and die-cast dies, cams, templates, rubber and plastic molds, tools, gages, models, fixtures, experimental work and boring and grinding jobs. Depending on the complexity of the job, a cross-slide rotary table can save from 50 to 90 pct in set-up time. (Morrison Machinery and Engineering Corp., Booth 402)



For more data circle No. 138 on postcard, p. 213

Socket-Cap Screws

Severe vibrations cause fastener problems. A new line of socket-cap screws are engineered to "lock" assemblies against such vibrations. As the screw is drawn into position, an insert is collapsed—filling in a counterbored hole. This creates a two-fold locking action. Each



You get greater strength . . . with

SHENANGO CENTRIFUGAL CASTINGS

Downtime, rejects, heavy maintenance costs and too-frequent replacements can be cut down *appreciably* by the use of Shenango extra-strong centrifugal castings.

They provide a finer, *pressure-dense* grain . . . with all the weakening defects eliminated, such as blowholes and sand inclusions.

Though built to stand the most rugged service, each Shenango casting is precisely-dimensioned to your exacting requirements. Whether you need rolls, bearings, bushings, mandrels, sleeves, liners, or any other essentially symmetrical part . . . *specify Shenango* for greater strength, greater wear-resistance, greater lasting power and greater savings, year after year.

Informative bulletins are yours for the asking. Write to: *Centrifugally Cast Products Division,* The Shenango Furnace Company, Dover, Ohio.

SHENANGO CENTRIFUGAL CASTINGS

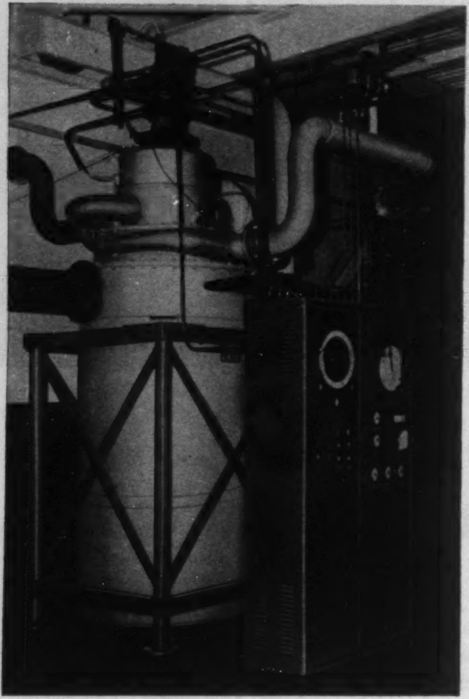
COPPER, TIN, LEAD, ZINC BRONZES • ALUMINUM AND MANGANESE BRONZES
MONEL METAL • NI-RESIST • MEEHANITE METAL • ALLOY IRONS

TESTED AND PROVEN

THERMAL

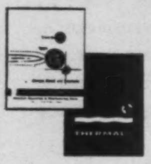
FIRED AIR HEATERS

Efficient, flexible, and compact, THERMAL direct and indirect fired air heaters have proved themselves in many industries. Built around the THERMAL high-velocity burner, they normally require no refractory, and operate efficiently on gas, light oil, residual oils, or waste fuel.



THERMAL fired air heaters can be adapted to pressures from 100 psig (direct fired) to 1500 psig (indirect fired), and in ranges from 250,000 to 50 million BTU/hr. They provide process heating for a wide variety of tasks, such as drying, heating annealing gas, cupola hot blast heating, and recirculating type furnaces and ovens.

THERMAL heaters offer you high versatility and lightning-speed response and are available as completely packaged units, with all safety and control equipment, ready to install.



SEND FOR BULLETINS

Bulletin #112 describes direct fired air heaters and Bulletin #113 covers the indirect fired heaters.

THERMAL

Thermal Research & Engineering Corp.

CONSHOHOCKEN • PENNSYLVANIA

REPRESENTATIVES IN PRINCIPAL CITIES

Other Thermal Products & Services:

Gas, Oil & Combination Burners
Heat Exchangers
Air Heaters
Gas Generators
Submerged Combustion
Combustion & Heat Transfer Equipment

screw and insert can be re-used numerous times with equal effectiveness. (Safety Socket Screw Co., Booth 403)

For more data circle No. 139 on postcard, p. 213

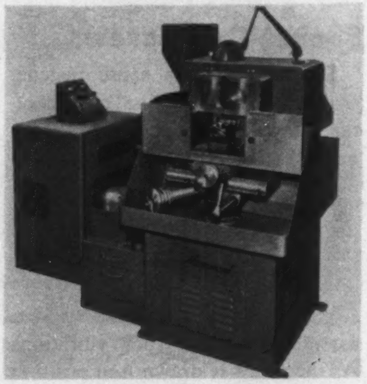
Multiple Drilling

Speed, efficiency and economy of multiple drilling and tapping will be demonstrated and featured at the show. A self-actuated drill unit is easily adapted to a variety of power sources. This unit has a built-in feed and return-air cylinder. Full cylinder stroke is 4 in. (Commander Mfg. Co., Booth 321)

For more data circle No. 140 on postcard, p. 213

Chip Breakers

Oscillating chip breakers and cup-wheel grinders are available in three styles. All three styles have the same motor-on-the-spindle grinding head. Spindle ends are tapered for true flange fits. All units

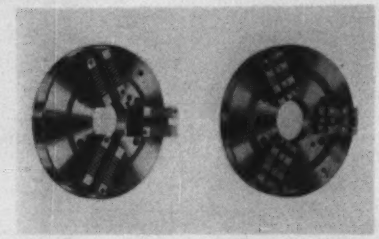


are equipped with a liquid—coolant or electrolyte—pumping system. A mist cooler is also provided. (Hammond Machinery Builders, Inc., Booth 432)

For more data circle No. 141 on postcard, p. 213

Jaw-Turning Fixtures

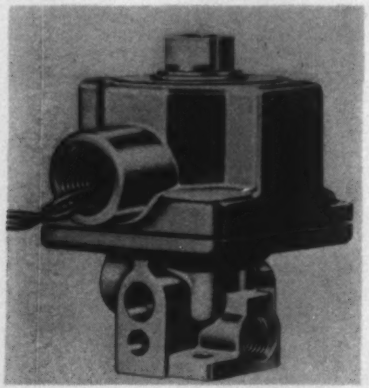
Teams of chucks and turning fixtures, designed to eliminate the production loss caused while automatic chuckers and turret lathes are down for turning jaws on the machines, will be exhibited at the show. These fixtures duplicate the power chucks' jaws. They are used in the tool room to hold top jaws for machining, or for grinding after hardening. (Buck Tool Co., Booth 244)



For more data circle No. 142 on postcard, p. 213

Three-Way Valves

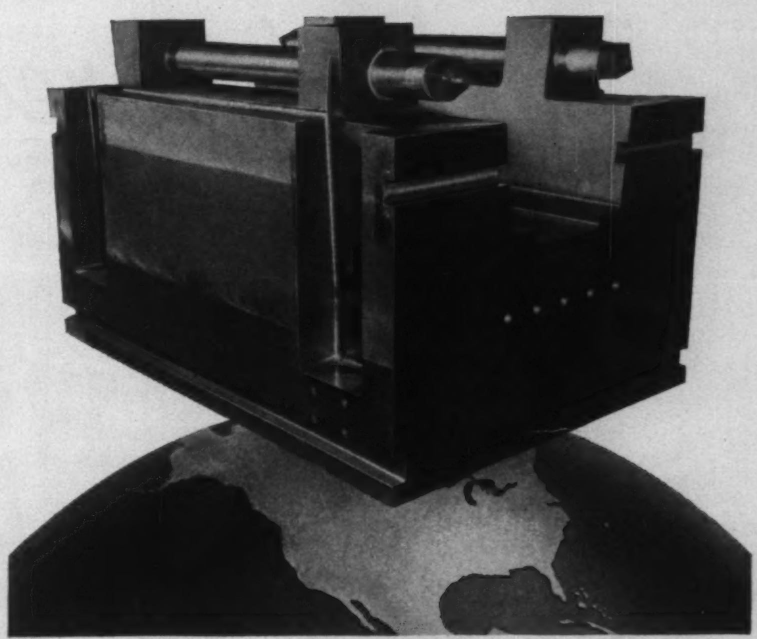
Multi-purpose 3-way valves have been designed for medium-sized cylinders. These valves are available for both ac and dc operation. Maximum pressure differentials up to 250 psi are possible. Pressure can be applied to any port. (Skinner Electric Valve Div., The Skinner Chuck Co., Booth 212)



For more data circle No. 143 on postcard, p. 213

Numerical Controls

Transistorized numerical control systems—designed to fulfill the requirements of the machine tool in-



FINKL TOOK 115,000 POUNDS OF STEEL
35 MILES UP*
TO MAKE THIS 36,000 POUND DIE HOLDER

*The Finkl Process of vacuum degassing steel in the ladle duplicates the atmosphere found at an altitude of 35 miles above the earth.

In this rarefied atmosphere, unwanted hydrogen, oxygen, non-metallic inclusions, and other impurities are literally boiled out of the molten steel, producing cleaner, tougher, stronger, more ductile, flaw-free products.

This 36,000 pound, 40" x 44" x 64" die holder is used in a heavy duty press. It was made of Finkl FX analysis, Temper 4, and finished machined in our shops.

All Finkl die blocks and hot work die steels are made from vacuum degassed electric furnace material produced in our own melt shop. Because of the clean, greatly improved qualities, you get more forging production, less downtime due to breakage, and savings in fewer tool regrinds.

You get more from Finkl in quality, continuing research, and engineering service. Call your Finkl representative for your forging, hot work die steel, and die block needs.

DIE BLOCKS · FORGINGS · ELECTRIC FURNACE STEELS · HOT WORK STEELS · F

SPECIFY FINKL DIE BLOCKS FOR "IMPRESSIONS THAT LAST"

A. Finkl & Sons Co.
2011 SOUTHPORT AVENUE • CHICAGO 14, ILLINOIS
Offices in: DETROIT • CLEVELAND • PITTSBURGH • INDIANAPOLIS • HOUSTON
ST. PAUL • COLORADO SPRINGS • SAN FRANCISCO • SEATTLE • BIRMINGHAM • KANSAS CITY
BOSTON • LOS ANGELES Warehouses in: CHICAGO • DETROIT • BOSTON • LOS ANGELES

Whadd'ya read!

PRODUCTION PROGRESS
METAL GRINDING & FINISHING
COATED ABRASIVE DISCS
THE COATED ABRASIVE BELT
ITS USE IN MACHINE TOOLS
COATED ABRASIVES TODAY
The Story of Industry's Great New Production Tool
FLAT GRINDING
POLISHING
WIDE
BELTS
EXTRA!
DAILY GRIND
abrasive tech
Facts on COATED ABRASIVES BARED!
BETTER
POLISHING
COATED ABRASIVE BELTS
BEHR-MANNING
Motion Pictures

ANOTHER **NORTON** PRODUCT

Take your pick of this FREE right-from-the-horse's mouth information on coated abrasives described on the card opposite. These are all facts you *know* are useful because they come from the authoritative source — BEHR-MANNING. Keep in touch — read about the how-to-do-it happenings that can lead to better production and bigger profits. Check and mail the adjoining post card today. BEHR-MANNING CO., Troy, N. Y., a division of Norton Company.

BEAR
BRAND
Coated Abrasives

THE LATEST IN COATED ABRASIVES INFORMATION

1. The Coated Abrasive Belt — Its Use in Machine Tools. Packed with simple diagrams and clear-cut photos, it describes 13 notable recent developments in the use of coated abrasive belts.

2. Production Problems Solved Here. Describes each piece of advanced equipment used in the Behr-Manning Methods Demonstration room. Read it for ideas on getting more out of your own machine tools.

3. Better Offhand Polishing. A 28-page manual covering machines, techniques, and abrasives. Fully illustrated. Includes a 4-page chart for quick reference on grits, belt speeds, lubricants, etc.

4. Production Progress. Jumbo-sized coverage of metal grinding and polishing. Articles by experts in various methods treat each subject in detail.

5. Coated Abrasives Today. Shows the range and variety of these materials for every grinding and polishing job.

6. Flat Grinding and Polishing with Wide Belts. A manual describing the advantages and techniques of this important process. Concise treatment through pictures and captions simplifies all the major developments that have recently added to its adaptability, speed, and efficiency.

7. Metal Grinding and Finishing with Coated Abrasive Discs. Covers one of the most basic operations in your plant. Gives you all the pointers recommended by experts, shows where and how disc grinding can be used to speed operations.

8. Behr-Manning Industrial Films. A picture is worth a thousand words, and these films give you step-by-step pictures of every coated abrasive technique. They're all listed and described in this handy book that belongs in the front row of your training literature.

9. Abrasive Tech. Here's the latest issue describing the newest developments in coated abrasive machines and methods.

Please send me the FREE booklets checked below, as described on this page:

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
6 ☐ 7 ☐ 8 ☐ 9 ☐

Name..........

Title..........

Firm..........

Street..........

City.......... Zone...... State..........

Whadd'ya read!

SEE OTHER SIDE
FOR
FREE
COATED ABRASIVE
LITERATURE

FIRST CLASS
PERMIT No. 1
Troy, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the U. S. A.

Postage will be paid by

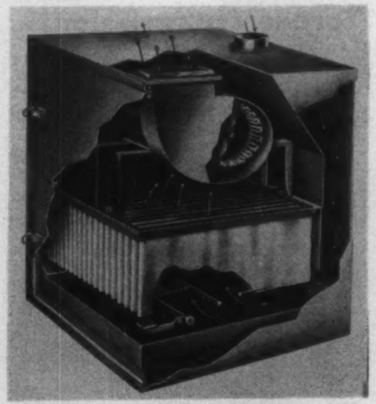
BEHR-MANNING CO.
Dept. 1A-8
Troy, New York

dustry—provide relatively inexpensive, simple to operate and easy to maintain systems which occupy a minimum of shop space. In addition to punched tape input for automatic operation, each system can be operated by manual input from rotary switch controls. A typical application to a jig borer will be shown. This illustrates the size, compactness and simplicity of the console design—housing the tape and manual controls. (Farrand Controls, Inc., Booth 103)

For more data circle No. 144 on postcard, p. 213

Dust Collectors

Cabinet cloth-filter dust collectors, whose efficiency is nearly 100 pct in typical industrial applications, will be among the equipment displayed at the Production Engineering Show. Compact and self-contained, a full line of cabinet collectors are available in a variety of standard and custom sizes for all types of applications where removal of gritty dust is required. These units serve in sanding, grinding and metal sawing operations. (Torit Manufacturing Co., Booth 401)



For more data circle No. 145 on postcard, p. 213

Carbide Inserts

Cemented-carbide inserts — designed to machine steel at elevated speeds — differ from conventional carbides in metallurgical structure. Bonding materials are carbides of other metals where conventional carbides are bonded with cobalt. The new inserts provide excellent tool life on production jobs where fine finish and close size-control are necessary on steel machining operations. (Vascoloy-Ramet Corp., Booth 124)

For more data circle No. 146 on postcard, p. 213

Variable-Speed Drives

Stepless variable-speed drives are the result of thorough redesign of exterior case and several key operating mechanisms. These drives are available with or without motor, with or without reverse, and with or without gearhead. All drives are for use with fractional horsepower motors. Speed can be changed at any time, running or not. Speed can be cut to true zero without shutting off the motor. (The Zero-Max Co., Booth 250)

For more data circle No. 147 on postcard, p. 213

Tapping Head

A new complete lead-screw tapping head enables unskilled help to produce precision tapped holes on any drill press. This new compact unit features a rapidly interchange-

ARMSTRONG

TOOL HOLDERS

A Correct Tool for Every Lathe Operation

You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

ARMSTRONG Tool Holders are long-lasting tools. They are strong beyond need, handy and efficient, profitable to use, and are readily available from your local ARMSTRONG distributor.

Check over your ARMSTRONG Tool Holder Needs. Write for literature.

If you do not know the name of your local ARMSTRONG Distributor, inquire when asking for literature.

SEE US AT BOOTH 238—PRODUCTION ENGINEERING SHOW
SEPTEMBER 6-16—NAVY PIER, CHICAGO, ILLINOIS

ARMSTRONG BROS. TOOL CO.
5209 W. ARMSTRONG AVE.
CHICAGO 46, ILL.

Standard and Special-Purpose

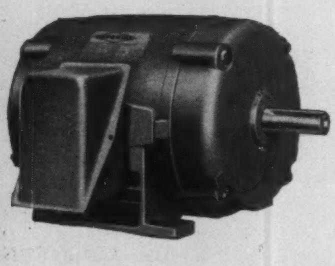
IMPERIAL ELECTRIC MOTORS

Computer Designed ...AND PROVED

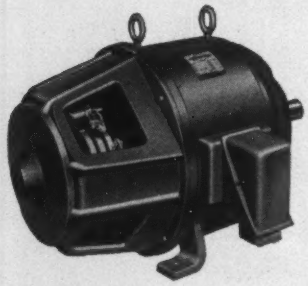
Modern as the missile age ... Imperial electric motors are created with a background of more than 70 years of industrial drive experience.

Now, through the use of electronic computers, multiple-design review is made possible in advance of production. Optimum performance is assured while delivery of special-purpose designs is speeded.

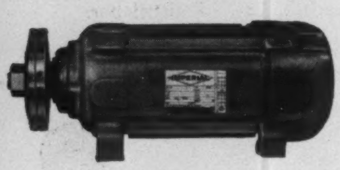
For standard NEMA motors and for motors to meet unusual drive requirements, you will do better with Imperial. Write for bulletin covering *The Imperial Line* of integral horsepower motors, generators and motor-generator sets for every application.



DRIP-PROOF A-C MOTOR—*Today's Best Buy for Most Applications—Ratings from 1 to 200 Hp.—Designs Include Flange and Face Types, Multi-Speed, etc.*



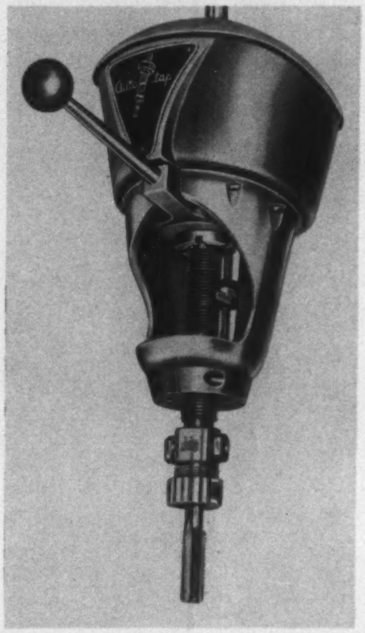
WOUND-ROTOR MOTOR—*Open Construction—Allows Easy Access for Inspection and Excellent Ventilation and Self-cleaning Action—From ½ to 150 Hp.*



PRECISION MOTOR ARBOR—*Totally-Enclosed Fan-Cooled—An Outstanding Example of the Rugged Special-Purpose Imperial Motor Line for Every Industry.*

IMPERIAL ELECTRIC COMPANY
84 Ira Avenue • Akron 9, Ohio

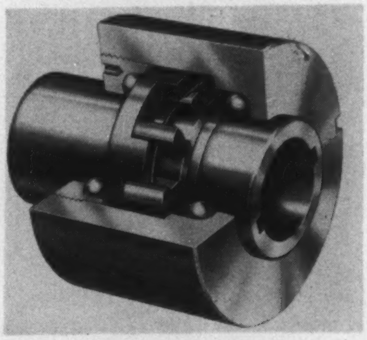
able lead screw, a sensitive cone clutch that runs in oil, and a positive depth control which assures perfect threads even in blind or recessed holes. A hardened precision-ground lead screw runs in a special alloy-bronze nut which is adjustable to compensate for wear. A rubberflex collet centers taps accurately in relation to the centerline of lead screw. (Ettco Tool & Machine Co., Inc., Booth 247)



For more data circle No. 148 on postcard, p. 213

Torque Transmission

A torque-transmission device completely blocks the possibility of reverse-torque feedback to the input shaft through the use of two opposing sets of full-complement sprags. The many-purpose device operates

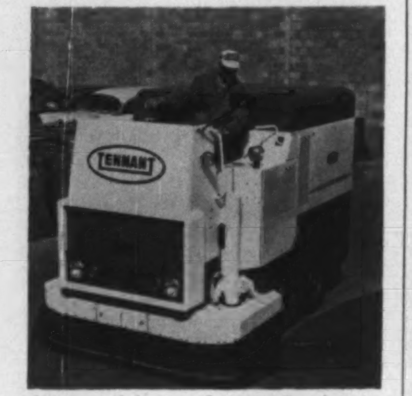


both clockwise and counter-clockwise to drive, position, over-run and backstop. (Formsprag Co., Booth 325)

For more data circle No. 149 on postcard, p. 213

Vacuum Sweeper

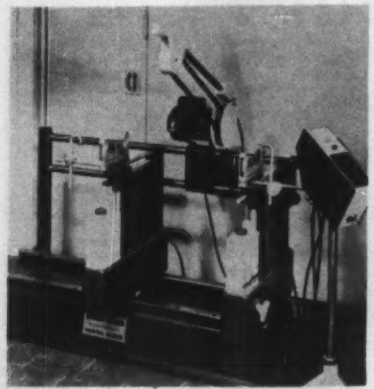
Chief feature of a new sweeper is its powerful vacuum system. Dust-laden air is forced through a 540 sq ft dust-filter system that removes dust particles as fine as 5 microns in diameter. Besides extra-clean sweeping, the sweeper features extremely high maneuverability. Its turning radius is the shortest of any sweeper of its size. It maneuvers easily around parked cars, machinery and between buildings. (G. H. Tennant Co., Booth 160)



For more data circle No. 150 on postcard, p. 213

Vertical Balancer

Versatile operation is possible with a vertical single-plane balancer. The machine balances clutches, fly wheels, sheaves, fans, blowers, pump impellors, slicer blades, or any rotating object which can be satisfactorily balanced using a single-plane method. An exclusive



Reservation Review
CANDIDATE KEOKUK

VOTERS ACCLAIM KEOKUK—KEMCO

KEOKUK, IOWA . . . Galloping Poll shows Chief Keokuk the coast-to-coast choice.

Says Mr. Galloping, "It looks like Campaign Managers Princess Wenatchee and Junior have a sure winner in Chief Keokuk who heads the Kemco Silvery ticket. Foundrymen and steel men know the Chief and they know that Kemco Silvery is the superior form of silicon introduction. When they vote, they'll vote for Chief Keokuk."

KEMCO SILVERY PIG IRON

SILICON METAL—OTHER FERROALLOYS

Kemco Silvery is easy to handle by magnet or count and it holds silicon loss to a minimum. Your choice of 60 lb. or 30 lb. pigs or 12½ lb. piglets in regular or alloy analysis for iron and steel production. Send for your copy of the free booklet, "For Lower Costs, Higher Quality Products." Also check the performance of Kemco Silicon Metal in aluminum!

Keokuk Electro-Metals CO.
Division of Vanadium Corporation of America
Keokuk, Iowa • Wenatchee, Washington

Sales Agent: Miller and Company
332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

K
TAKE A TRIP

feature: The electronic unit, the strobe light and the meter head—along with the vibration pickup—can be taken to a vehicle. This allows them to be used as a vibration analyzer. (Stewart - Warner Corp., Booth 465)

For more data circle No. 151 on postcard, p. 213

Positioning Systems

One of a family of control systems, the series-400 positioning system provides manual, manual-numeric and punch-tape control of

cutting tools or workpiece position. Modular or building block design allows the user to purchase the exact degree of control and the specific features required for his particular needs. The system is available in two versions. The standard model has been designed for jig borers, layout-drilling tables, boring mills and similar machine tools. A high-speed version is particularly suited to drilling tables and other applications where rapid positioning is of prime importance. (Norden Div., United Aircraft Corp., Booth 221)

For more data circle No. 152 on postcard, p. 213

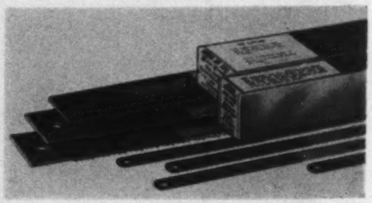
QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

Hacksaw Blades

High-speed hacksaw blades have outlasted competitive blades 2 to 1. This contributes as much as 50 pct



saving in blade cost to the user. Improved metallurgical control of high-speed steel is credited with giving the new blade line a more efficient and more durable cutting edge. (Atkins Saw Div., Borg-Warner Corp., Booth 326)

For more data circle No. 153 on postcard, p. 213

Oil-Tight Switches

Production's number one enemy—limit switch failure—has met its master in a completely new family

CHICAGO SECTION
AMERICAN WELDING SOCIETY
presents
"WELDING PROCESSES"
at
CHICAGO BRIDGE & IRON CO. DOME
1305 W. 105TH ST., CHICAGO, ILL.
Time: 7-9 p.m., Thursday
Sept. 22—Metal Arc—Inert Gas
Sept. 29—Tungsten Arc—Inert Gas
Oct. 6—Resistance
Oct. 13—Shielded Manual Arc—Part I
Oct. 20—Shielded Manual Arc—Part II

FORGINGS
ALL SIZES, pressed . . rolled . . extruded . . forged to accurate specifications from carbon, alloy, stainless steels and special metals. Modern metallurgical, die, heat-treating and rough machining facilities.
Over 50 years of forging design and development
THE CANTON DROP FORGING & MFG. CO.
CANTON, OHIO

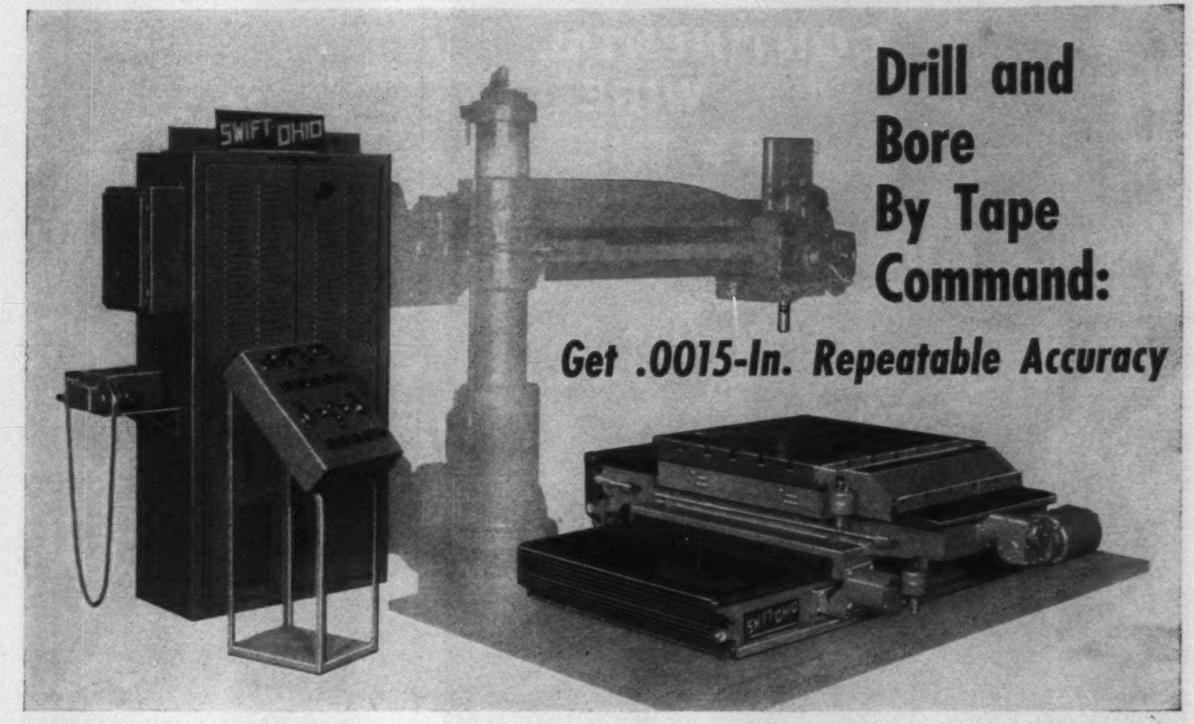
DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates

DYKEM STEEL BLUE
SPECIMEN
With DYKEM Steel Blue
Without DYKEM Steel Blue

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2303G North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING
DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.
THE DYKEM CO., 2303-G NORTH 11TH ST., ST. LOUIS 6, MO.



Drill and Bore By Tape Command:

Get .0015-In. Repeatable Accuracy

The Compound Indexing Table By SWIFT OHIO

Numerically Controlled
. . . Handles Work Loads Up to 4000 Lbs.

Designed For Use With Radial Drills, and Horizontal and Vertical Drilling Machines

This SWIFT OHIO unit handles drilling thrusts of 5000 lbs. Traverse rate is 150 in. per minute. Deflection, with work load, is .001 in. Absolute accuracy on drilled hole location is .0015 in.

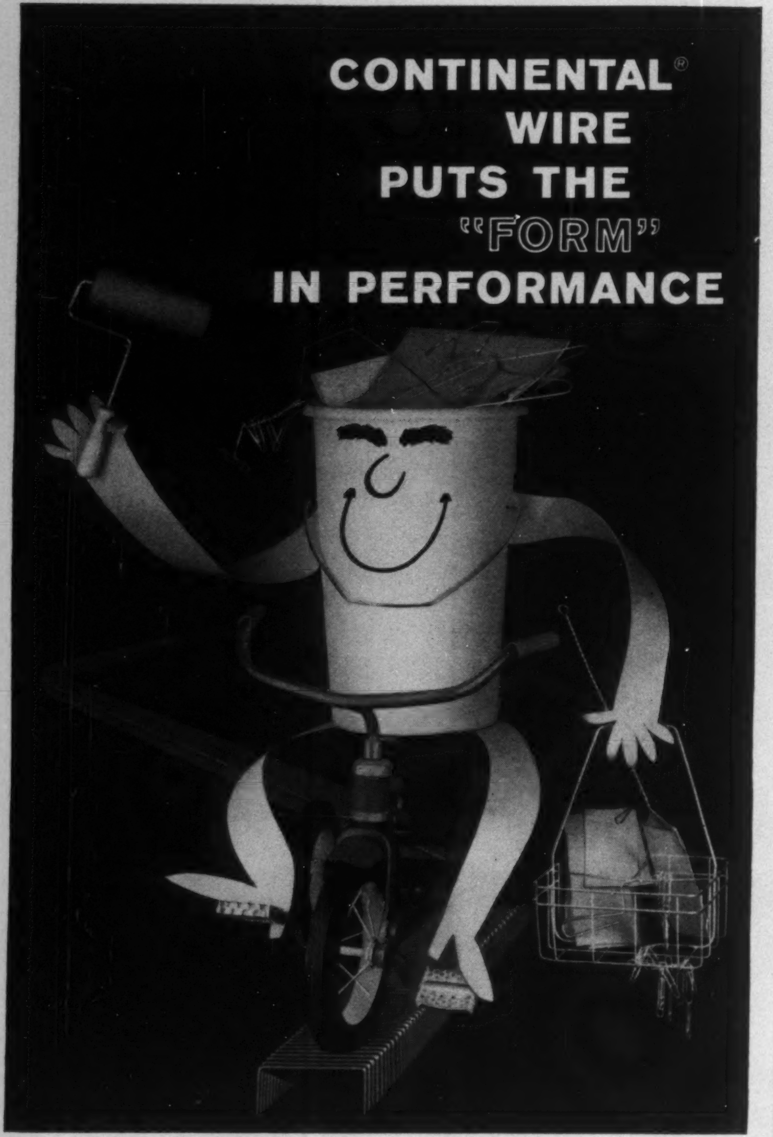
The numerical positioning control unit seen here is the GE Mark II: Other control units can also be used with the SWIFT OHIO Compound Indexing Table. The table is available in a variety of sizes and travel lengths to meet your automated production needs with maximum economy, speed and accuracy.

Maximum rigidity — accurate alignment — electrical accuracy — precision ball bearing positioning screws — covered bearing ways: These are a few of the many features SWIFT OHIO offers you in this modern unit.

Write or Phone us Today. We'll be happy to send complete details.

OHIO SWIFT OHIO
CORPORATION
KENTON, OHIO

MULTIPLE-OPERATION EQUIPMENT FOR WELDING, MACHINING, ASSEMBLY, SPECIAL MACHINERY



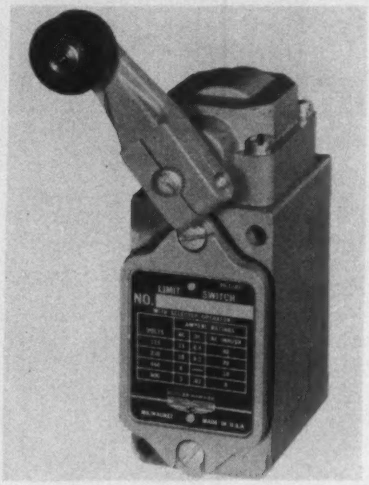
Formability that permits difficult twists and bends . . . sustained fast production in coil after coil . . . smooth tight coatings that do not powder, flake or peel to jam machines. Such wire calls for consistent, uniform quality. You can get it at Continental, in sizes and finishes to meet most specifications—from 5/16" on down to 40 gauge, in various tempers and analyses, in low and medium low carbon steels. Special shapes, too. Why not let our mill technicians work with you on any problems you may have pertaining to wire fabrication. We may have the answer to a particular need. Write today for your FREE copy of our new wire manual.

Wire Specialists for over half a century

CONTINENTAL STEEL
CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

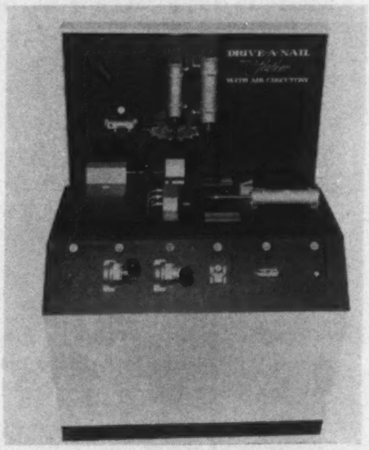
of limit switches. Specifically designed for applications on high-speed, precision production machines, these new switches are truly oil-tight. They are ideal for installations where high impacts and adverse environmental conditions are recognized as major factors in limit switch failure—and subsequent machine downtime. (Cutler-Hammer Inc., Booth 142)



For more data circle No. 154 on postcard, p. 213

Air Controls

Feather-light action controls several types of pneumatic devices. Multi-position air cylinders and 7 different types of directional air valves will be featured in an unusual pneumatic operation. (Westinghouse Air Brake Co., Booth 301)



For more data circle No. 155 on postcard, p. 213

MMT=PE

Visit Area No. 1134
MACHINE TOOL EXPOSITION
International Amphitheatre, Chicago, Sept. 6-16

CHICAGO
DREIS & KRUMP

Mechanical and Hydraulic Press Brakes in Operation and Press Brake Tooling

Bending and Forming

Sheet Metal and Steel Plate

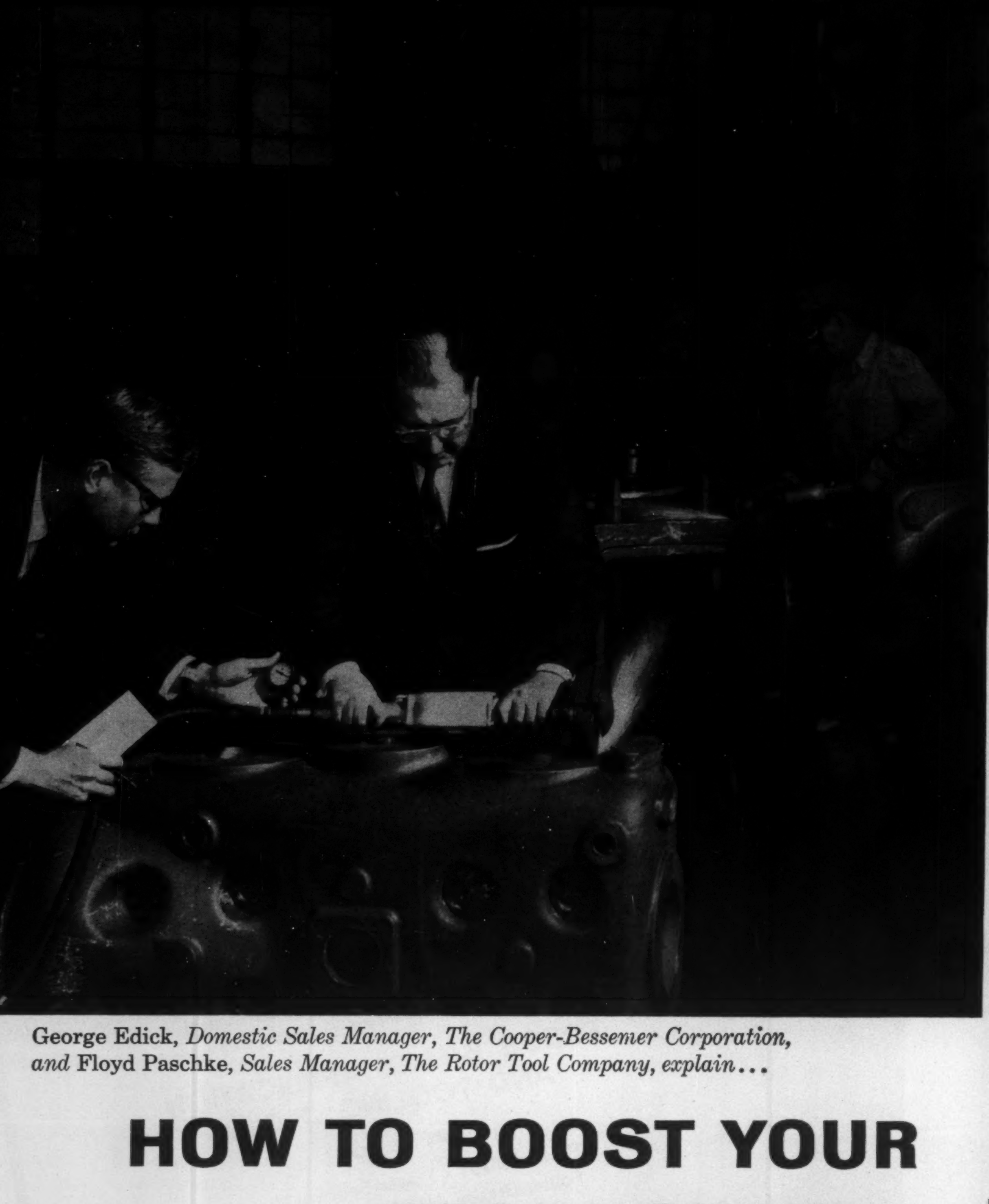
AT THE FACTORY
7400 South Loomis Boulevard
15-minute ride from Amphitheatre • Courtesy cars available

PRESS BRAKE APPLICATION AND TOOLING CLINIC

and see more

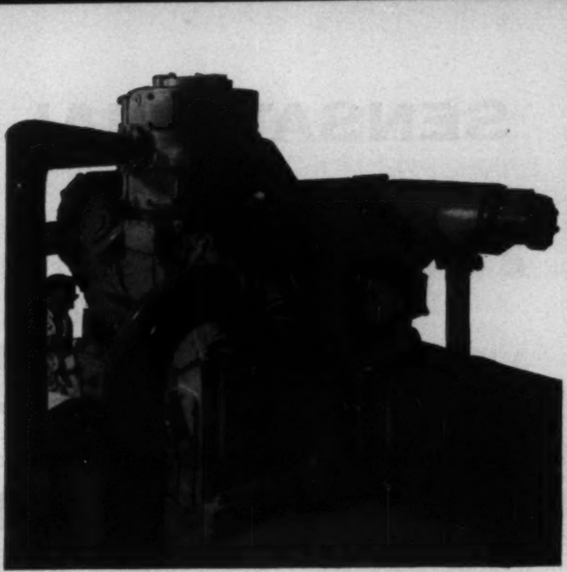
Press Brakes • Power Bending Brakes
Folder Brakes • Hand Bending Brakes

9519

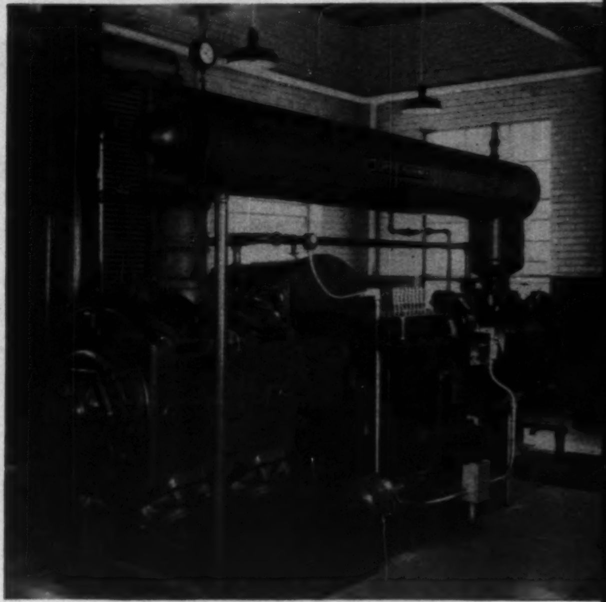


George Edick, *Domestic Sales Manager, The Cooper-Bessemer Corporation, and* Floyd Paschke, *Sales Manager, The Rotor Tool Company, explain...*

HOW TO BOOST YOUR PRODUCTIVITY WITH COMPRESSED AIR



Installing a Cooper-Bessemer DMR-3 Air Compressor for foundry service. Capacity is 1670 cfm at 110 psig discharge. Other units available for service down to 572 cfm.



Cooper-Bessemer Model EM Air Compressor in a metalworking plant. Rated 1125 cfm at 110 psig discharge. Other models in ratings up to 10,000 hp.

The thing that counts in getting top output with air tools is *air pressure at the tool, under load.* Is this productivity what it should be in *your* plant? Here is a service that helps you find out *for sure . . .*

The teaming up of application service engineering of Cooper-Bessemer and its new subsidiary, Rotor Tool, provides full-scope experience to help you analyze your compressed air needs and plan your facilities for optimum production efficiency. This experience encompasses the study of compressor capacity requirements, number of compressors and their location for greatest economy, regulation of the plant, the distribution system and portable air tools. This service is yours without obligation.

It will pay you to call in the nearby application engineer of Cooper-Bessemer or Rotor Tool to help you make sure that you are getting maximum productivity with compressed air.

BRANCH OFFICES: Grove City · New York · Washington · Gloucester
Pittsburgh · Chicago · Minneapolis · St. Louis · Kansas City · Tulsa
New Orleans · Shreveport · Houston · Greggton · Dallas · Odessa · Pampa
Casper · Seattle · San Francisco · Los Angeles

SUBSIDIARIES: Cooper-Bessemer of Canada, Ltd. . . . Edmonton
Calgary · Toronto · Halifax · Stratford
C-B Southern, Inc. . . . Houston
Cooper-Bessemer International Corp. . . . New York · Caracas · Anaco
Cooper-Bessemer, S.A. . . . Chur, Switzerland · The Hague, Netherlands
Mexico City
The Rotor Tool Company . . . Cleveland

Cooper-Bessemer

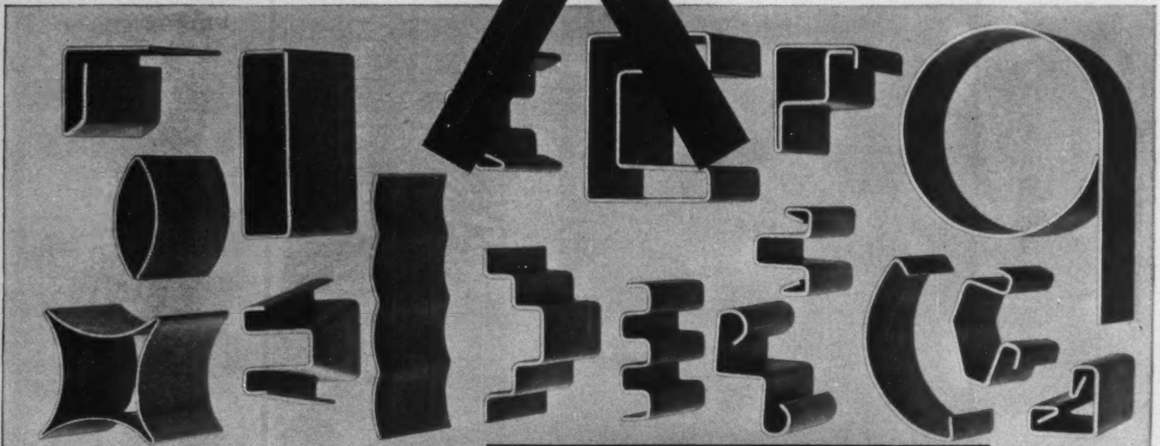
GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES: GAS · DIESEL · GAS-DIESEL
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL,
ENGINE, TURBINE OR MOTOR DRIVEN

SENSATIONAL

form-all

Power models to be first shown at the Machine Tool Exposition



Short sections of typical pieces produced with Form-All.

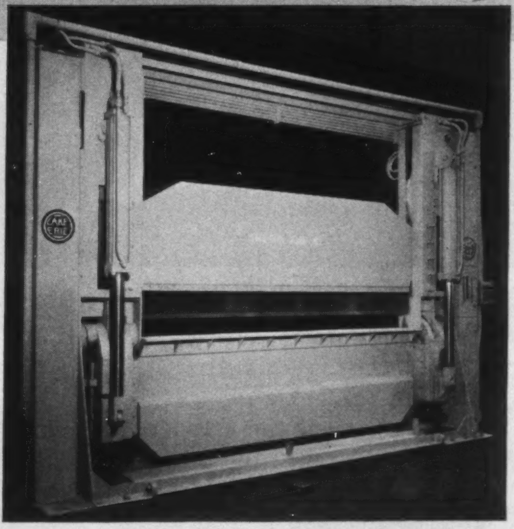
FORMS

SHEET AND PLATE

WITHOUT

DIES

produces "impossible" one-piece shapes



Hand—Air—Hydraulically Operated Models; capacities from 2 ft. x 16 ga. to 16 ft. x 3/4 in.

LAKE ERIE
HYDRAULIC
PRESSES

SEE HOW IT WORKS **BOOTH 542**

The Machine Tool Exposition International Amphitheatre

LAKE ERIE *machinery corporation*

368 Woodward Avenue, Buffalo 17, New York

NEW YORK • DETROIT • CHICAGO • LOS ANGELES

Complete Engineering and Manufacturing Facilities for Designing and Building Highly Specialized Hydraulic Presses

Exhibit at Coliseum Accents International Machinery

▪ Machinery producers from many free nations of the world will display their new equipment at the 2nd International Coliseum Machinery Show, September 7-15, in Chicago.

Sponsors of the show will have about 70 exhibits, most of which will emphasize higher speed and efficiency in metalworking production. Using the requests for invitations as a guide, attendance at the show is expected to reach a new high.

A. B. Perkins, show chairman, says requests for invitations have been sent to thousands of top executives and management personnel throughout the country and the principal manufacturing centers of the free world.

Interest Has Grown—Not only will American machinery be displayed, but also units produced by foreign nations. They are expected to draw much interest among users.

The show will last for nine days with registrants from the other show being admitted as guests at the Coliseum.

Coliseum Machinery Show

September 7-15

1 to 10 pm

(Except Sunday)

2nd Coliseum Machinery Show, List of Exhibitors

Exhibitor	Space No.
A	
Allied Mfg. & Sales Co.	422
American Pullmax Co., Inc.	207
Antares Instruments, Inc.	123
Atlas Press Co.	736
B	
Barer Engineering & Machinery Co., Ltd.	551
R. Beorgeois & Cie	316
C	
Cawi Machine Co., Inc.	121
Cazeneuve Sales Co.	502
Columbia International Corp.	652
Comet Industries	107
Corpet Louvet & Cie	722
Cosa Corporation	117, 754, 653
Crane Packing Company	550
D	
Decherts	751
DoAll Company	528
E	
Easco Products Inc.	222
Elox Corp. of Michigan	726
F	
The Fenn Mfg. Co.	515
G	
Gisholt Machine Co.	518
Grob, Inc.	641
H	
E. G. Hellers Son, Inc.	110
Hermes Machine Tool Co.	710
I	
I. O. Johansson Co.	215
J	
Jones & Lamson Machine Co.	554
L	
Lapointe Machine Co.	521, 622, 628, 625
Lennox Tool & Machine Builders	127
Le Progres Industriel	554
M	
Machinery Dealers National Assn.	750
Marac Machinery Corp.	417
Masters Precision Tools	111
Mercuria Co.	211
Merrill Brothers	114
Mitsubishi International Corp.	543, 636, 644
Mitts & Merrill, Inc.	320
N	
Nationwide Engineering Service	224
O	
Olivetti Corp. of America	609
P	
Pathex Ltd.	122
Powermatic Machine Co.	105
R	
Retor Developments Limited	647
S	
S & S Machinery Co.	443, 536, 544
Sigma Machinery Co.	610
South Bend Lathe, Inc.	210
Speedlap Corp.	312
Spitfire Tool Machine Co.	520
Stone Machinery Co., Inc.	326
T	
Tree Tool & Die Works	510
Turbo Tronics Corp.	226
U	
Uniloy, Inc.	214
Universal-Automatic Corp.	748
Upton Bradeen & James, Inc.	402
W	
Wells Manufacturing Corp.	615
Wickman Mfg. Co.	621
Winslow Product Engineering Corp.	223
W. F. Wells & Sons	702

if
HEAT
is
YOUR PROBLEM
call
ROLLED ALLOYS
for

RA 309

RA 310

RA 330

IN STOCK—
IMMEDIATE DELIVERY
Send for Stock List or Literature

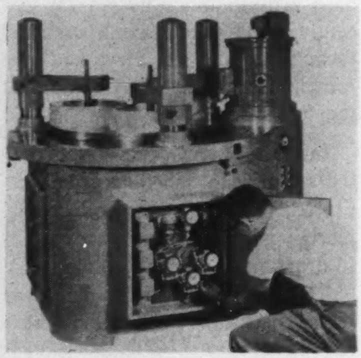
ROLLED ALLOYS, INC.
Heat and Corrosion Resistant Alloy Specialists
RA

5307 Concord Avenue • Detroit 11, Michigan
333 William Street • South River, New Jersey

Coliseum Machinery Show Previews

Flat Lapping Machine

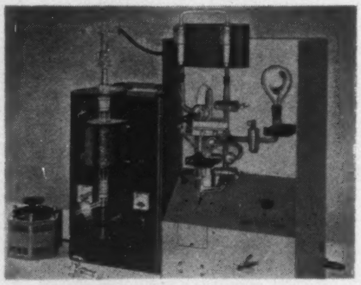
Pneumatic lifts on a 36-in. precision lapping machine insure three-point bearing contact. This permits the rings to revolve freely on the lap plate. Simple screw adjustment also permits ring positioning upon the lapping plate for correction purposes. This truing action continually and automatically conditions the lapping surface. (Spitfire Tool and Machine Co., Booth 519)



For more data circle No. 1 on postcord, p. 213

Hydrogen Analyzer

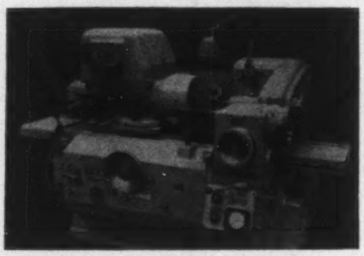
Practically all metals contain elements other than those given in the usual chemical analysis. Among these are the gases, hydrogen, oxygen and nitrogen. Although usually present in only a few parts per million, they have physical effects considerably out of proportion to the small amount present. Each of the above-mentioned gases has its own effects. The gas most frequently absorbed by metals is hydrogen. Liquid copper, iron and nickel will dissolve hydrogen in large quantities. Even in the solid state, tantalum is capable of absorbing large amounts of hydrogen. The need for a low priced, fast hydrogen analyzer for analysis of metal samples has been met by development of a new unit. This unit detects "dissolved" hydrogen in such metals as tungsten, titanium, nickel, zirconium, columbium and steel. (Laboratory Equipment Corp., Booth 908)



For more data circle No. 2 on postcard, p. 213

Precision Tools

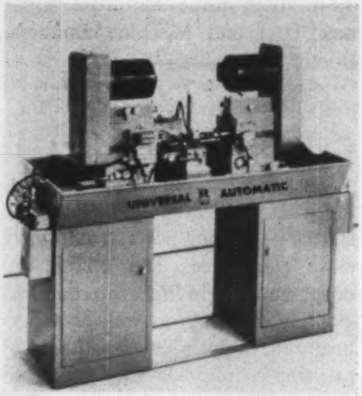
An exhibit of British-built precision machine tools is claimed to be the largest powered exhibit at the forthcoming Coliseum Machinery Show. The company will have 16 machines on exhibition—all under power. They will be producing production parts. Very fine tolerances under which they operate will indicate the built-in quality of this group of general and special purpose machine tools. (Lapointe Machine Co., Booth 726)



For more data circle No. 3 on postcard, p. 213

Machines and Systems

Versatile machines and systems are especially useful to speed up drilling, tapping, reaming, nut tapping, cross-drilling, hollow-milling, counter sinking and other operations. These units may be mounted at any angle or in any position desired. Each unit has an individual spindle-drive motor. Speeds range from 500-10,000 rpm. This allows each spindle to run at the proper speed for the operation being performed. Each self-contained unit has a maximum spindle stroke of 2½ in. and is adjustable down to ⅛ in. Maximum capacity is 0.020-⅜ in. drilling and/or up to ⅜ in. tapping in mild steel. Individual spindles are advanced and retracted by twin double-acting air cylinders. These cylinders are complete with intake and exhaust air-metering controls. They also incorporate an air-pressure regulator with a gage that operates on shop air supply—15 to 100 psi as required. Electrical control circuit is 110 v. (Universal-Automatic Corp., Booth 748)



For more data circle No. 4 on postcard, p. 213

Vertical Contour Saw

Featuring infinitely variable cutting speeds from 50-3000 fpm, a vertical contour saw can also be used as a filing machine. The speed is regulated by a handwheel. Selected speed is read on a built-in speedometer. The machine has aluminum wheels coated with vulcanized rubber handles. It is equipped with a built-in butt-welder — with shear and grinding motor, chip blower, weight-operated feed, a four-way tilt table and a 4-hp motor. (Hermes Machine Tool Co., Inc., Booth 710)

For more data circle No. 5 on postcard, p. 213

Automatic Feed

Announcement has been made of the availability of an automatic-feed attachment for the Comet

One
DETECTO
Speed Scale does
the work of
two
operators

Streamline your plant operation with this trouble-free, simplified, highly sensitive scale. The slightest discrepancy of over-weight or under-weight is instantly revealed by DETECTO'S over-under indicator. Write for information on full line of industrial weighing equipment from 1/100 oz. to 100 ton: • DETECTO SCALES, INC.
Dept. W-1 540 Park Ave., Brooklyn 5, N. Y.

EXECUTIVE REPORT #11

HERE CARBON STEEL SHEDS ITS SCALE

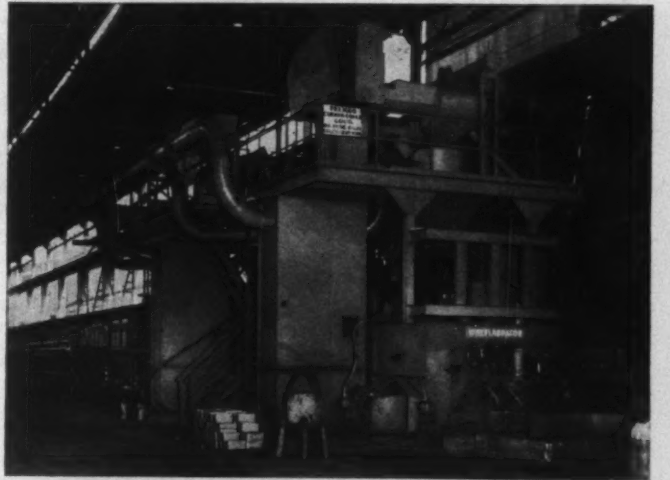
Wheelabrator® Descaling Enables 100% Increase in Production

Every ton of steel produced in the modern mill of Altos-Hornos De Mexico, S.A., at Monclova, Coahila, is run through a Wheelabrator airless blast descaling cabinet. In a typical month, over 15,500 tons of carbon steel from a hot Steckle reversing type mill was Wheelabrator descaled followed by a light pickle rinse. The end product is reduced on reversing cold mills for sale as cold rolled steel, tin plate, and galvanized stock.

Steel is descaled in this new line at a rate of up to 200 f.p.m. contrasted to a speed of only 100 f.p.m. when acid pickling was used exclusively for descaling. Even with this increase in production, acid consumption has been cut in half and overall descaling costs materially reduced.

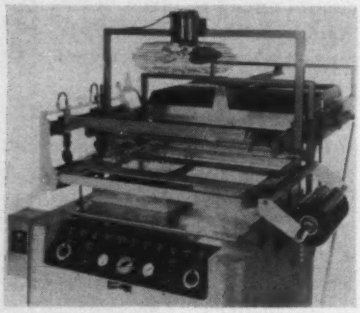
Wheelabrator Engineering Experience At Your Service

Write today for information on how Wheelabrator descaling can cut your costs and speed production. Wheelabrator Corporation, 510 S. Byrkit St., Mishawaka, Indiana. In Canada, P.O. Box 490, Scarborough, Ontario.



WHEELABRATOR
AIRLESS BLAST EQUIPMENT

Meteor — a low-cost, drape-type thermo-forming machine. This attachment is available on new machines or can be added to equipment now in the field. It completely automates the machine. Thus, the operator is released for other duties. Addition of this feed greatly increases vacuum forming and packaging capacities. Basic features of the attachment are: automatic loading and unloading of the clamp frame; feeding of roll stock automatically; after-forming web is slit into strips; separating blisters or skin packages. (Comet Industries, Booth 107)



For more data circle No. 6 on postcard, p. 213

Shear, Form and Pierce

Most outstanding feature of a line of shearing, forming and piercing machines is that they cut in the center of ¼-in. mild-steel plate without a starting hole. Other improved features include: a simplified-stroke adjustment with positive-stroke scale; a new streamlined design of great "ruggedability" with all controls on one side of the machine—for ease of operation. This new model has all of the operational and safety features of previous models. The new unit has a maximum throat depth of 49¼ in. This permits circle cutting up to 48-in. diam inside the throat. (Lennox Tool and Machine Builders, Booth 123)

For more data circle No. 7 on postcard, p. 213

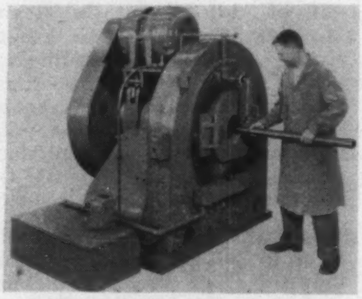
Cylindrical Grinders

Two Studer universal and cylindrical grinders will be demonstarted—grinding parts to extremely close tolerances. The RHU 450 does match grinding, internal and external grinding, as well as superfine and lap-grinding to the most exacting requirements for geometrical accuracy and surface finish. The RM 250-L, a new external production grinder—shown for the first time in this country—is one-lever controlled with automatic cycling and table traverse. (Cosa Corp., Booth 653)

For more data circle No. 8 on postcard, p. 213

Swaging Machines

Special hydraulically - actuated wedges permit wide die openings on a new swaging machine. This machine serves for internal and central reductions in the attaching of fittings such as balls to cables. The unit which will be exhibited is especially designed for tube pointing and for use with automatic loading and unloading accessories. It consists of two hydraulically-operated jaw assemblies with a capacity for 4-in. diam tubing. (Fenn Mfg. Co., Booth 515)



For more data circle No. 9 on postcard, p. 213

ADVANCE CANTON FLANNEL
HOTMILL GLOVES

THE FINEST HOTMILL GLOVE ON THE MARKET

Extra large. Zigzag quilting will never ravel out. "Cushion Palm" offers more protection—better wear.

Write for free catalog

PLANTS IN . . .
DETROIT CHICAGO, TOLEDO, ROME, GEORGIA

ADVANCE GLOVE MFG. CO.
919 W. LAFAYETTE BLVD., DETROIT 26, MICH.

INDUSTRIAL FASTENERS and FASTENER SPECIALTIES

Immediate delivery...

BAYONNE SINCE 1912

HIGH TENSILE BOLTS from 5/8" to 1-1/4" dia.

STUDS from 3/8" to 3" dia.

COUNTERSUNK HEAD BOLTS from 1/2" to 1-1/4" dia.

CAP SCREWS from 1/4" to 2" dia.

CARRIAGE BOLTS from 3/16" to 1" dia.

LAG BOLTS from 1/4" to 1-1/4" dia.

BUTTON HEAD BOLTS from 1/2" to 1-1/4" dia.

MACHINE BOLTS from 1/4" to 4" dia. to any length

Hot Dip Galvanized or Black
Made of Steel or Genuine Wrought Iron to your specifications

BAYONNE BOLT & NUT CORPORATION
WORKS & GENERAL OFFICE: BAYONNE, N. J.
32 West 2nd St., Bayonne, N. J.

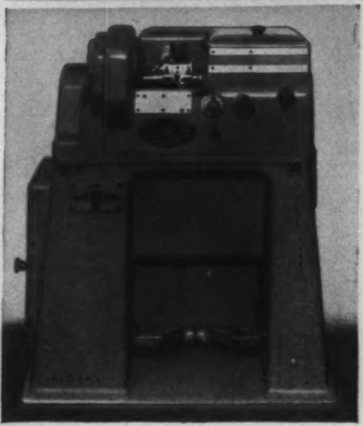
YOU *save money* by threading with CRI-DAN

SEE for yourself the advantages CRI-DAN offers:

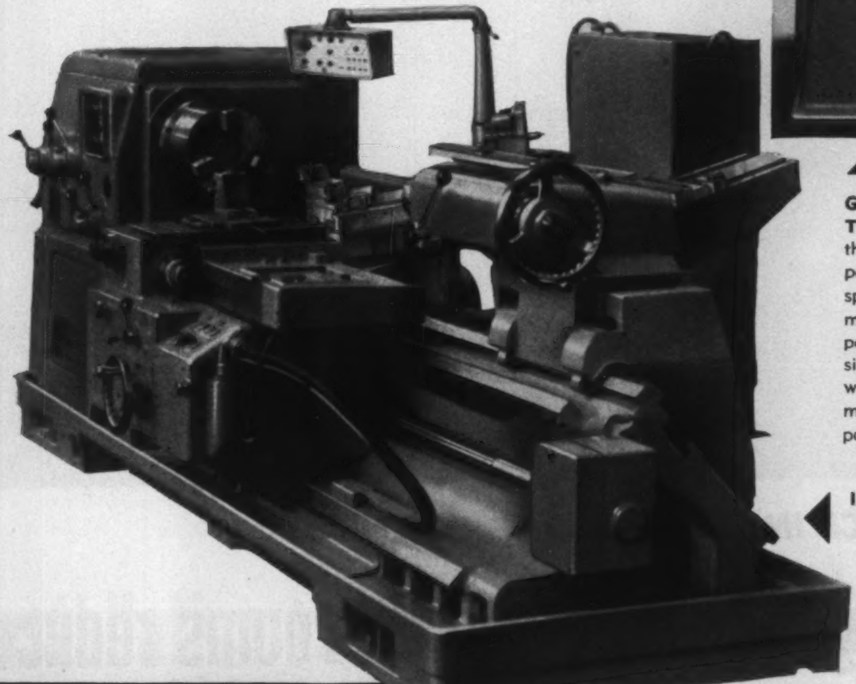
- Low Tooling Cost — single-point carbide tool eliminates costly taps, dies, thread milling cutters and thread grinding wheels;
- Speed — dramatic time savings through fast automatic cycle and fast, simple setup;
- Precision — all types of work and materials — single- and multiple-start, coarse or fine, straight or tapered, left- or right-hand, internal or external — right up to shoulders.

GISHOLT BOOTH 518

second coliseum machinery show

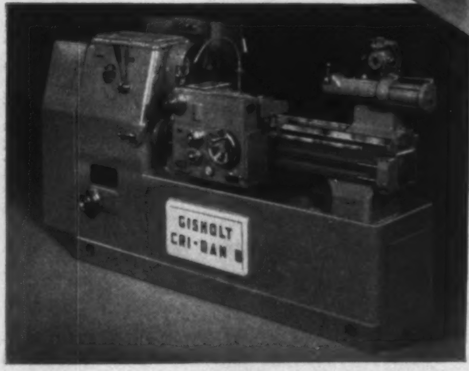


GISHOLT CRI-DAN A Threading Lathe — for threading small precision parts at peak production speeds. The carbide tool makes up to 150 passes per minute! The operator simply loads and unloads work, controlling the machine from a sitting position.



INTRODUCING—the GISHOLT CRI-DAN FT-80 Threading and Turning Lathe

For the first time see one machine perform threading, turning, facing, boring, tracing and cut-off, using single-point carbide tools throughout, in one fast automatic cycle.



GISHOLT CRI-DAN B Threading Lathe — demonstrates 15-minute setup; threading and tracing of high-tensile bolts and related parts; versatility for all types of work and materials at production rates far above those possible with thread milling or thread grinding.

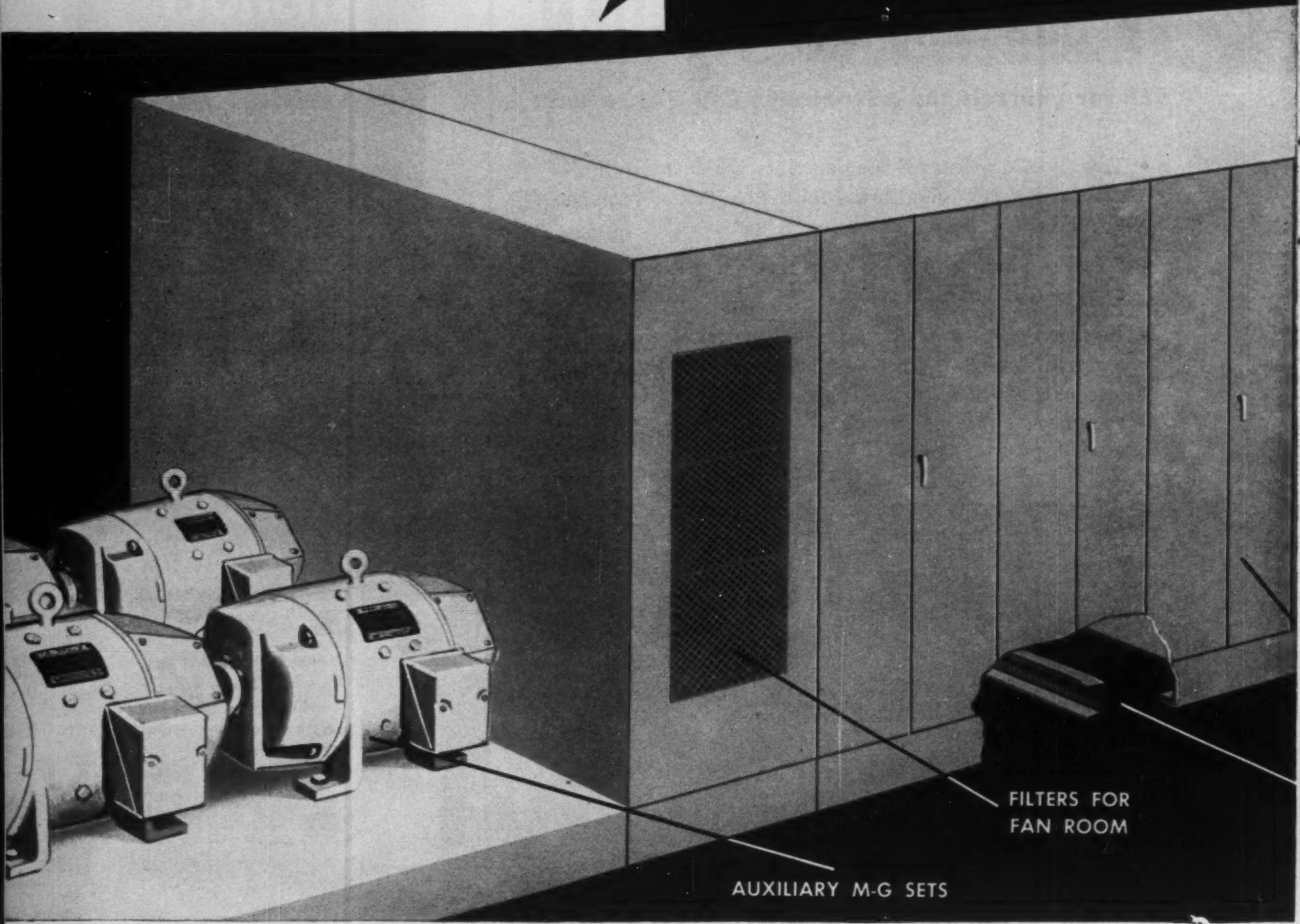
GISHOLT

MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers (R) • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

FOR QUALITY...
PRODUCTIVITY
... PROFIT

METAL ROLLING
AUTOMATED BY GENERAL ELECTRIC



A NEW PRACTICE IN PROCESS-LINE CONTROL

G-E "packaged" motor-control rooms reduce

The latest innovation in modern steel-mill process-line control is General Electric's new "packaged" motor-and-control room. This novel design, developed jointly by General Electric and Jones and Laughlin Steel Corp., groups all controls and m-g sets into one compact centralized unit. The above unit will be installed at J&L's Aliquippa, Pa., works, as part of their continuing facilities-improvement program. Previously, the installation expense on this equipment often matched or exceeded the actual cost of the equipment. The new G-E motor-control room design cuts installation costs as much as 40 percent!

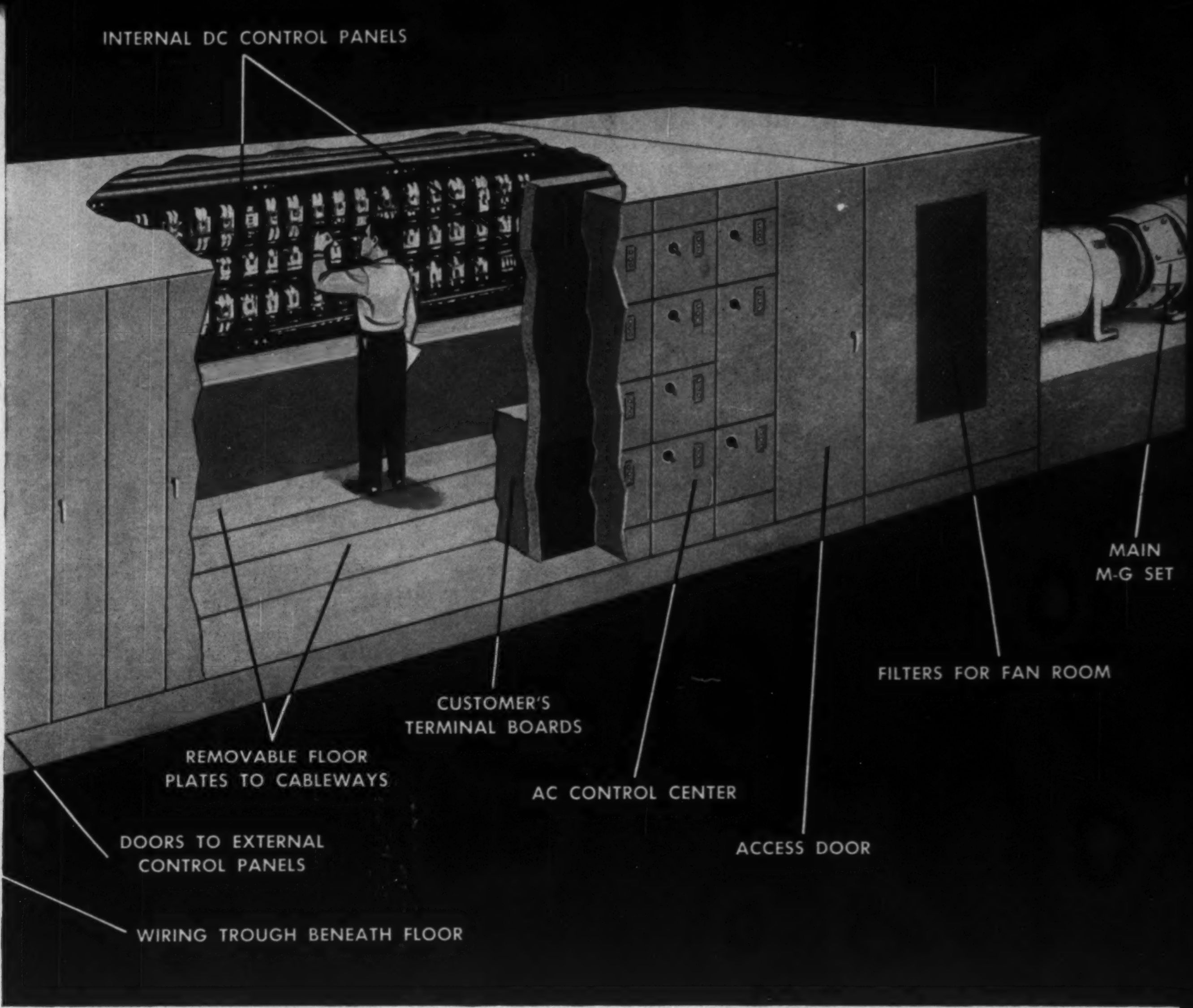
HERE'S WHY INSTALLATION COSTS ARE LOWER

Substantial savings on installation expenses can be realized through these features:

Independent control unit—The General Electric motor-control room is a completely co-ordinated, pre-assembled unit in itself, and in many cases, eliminates the need for a separate motor room. Since the motor-control room is self-contained, it may be located either near the driven equipment or in some previously unused area of the mill.

Field wiring is reduced by one-third or more—All internal connections are made and tested before the motor-control rooms are shipped. The only field wiring required is the connection of the power source and the leads to the operators' stations and the drive motors.

Construction engineering costs reduced—General Electric's grouped control concept enables the mill to know its conduit requirements much sooner. Thus, fewer,


INTERNAL DC CONTROL PANELS
MAIN M-G SET
FILTERS FOR FAN ROOM
CUSTOMER'S TERMINAL BOARDS
REMOVABLE FLOOR PLATES TO CABLEWAYS
AC CONTROL CENTER
DOORS TO EXTERNAL CONTROL PANELS
ACCESS DOOR
WIRING TROUGH BENEATH FLOOR

installation costs as much as 40 percent!

less-complex construction diagrams are needed, and actual construction can begin at an earlier date.

Common base minimizes installation time—This new "packaged" motor-control room, delivered on its own self-supporting platform, can be immediately set on a normal mill floor. It does not require expensive, specially-constructed foundations. With m-g sets built and shipped on a common base, the need to align them at the mill site is eliminated. In addition, regulating equipment is factory-tested prior to shipment, further expediting startup time.

For all the details on this new technique in process-line control, contact your G-E Sales Engineer today! General Electric Company, Industry Control Department, Salem, Virginia, and Direct Current Motor and Generator Department, Erie, Pennsylvania. 785-7

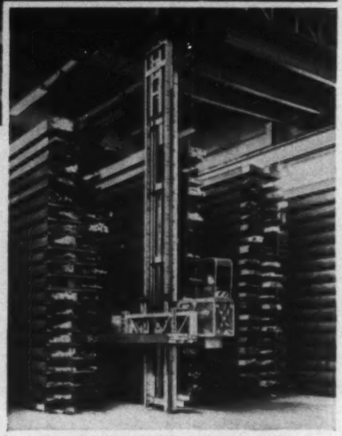
Progress Is Our Most Important Product

GENERAL ELECTRIC

Steel Warehouse Handles 3500 Stock Items with "TRAK-RAK" Crane

——— *Reduces Operating Costs... Speeds Service*

1. "TRAK-RAK" Crane moving into aisle between double rows of racks. Racks are 20 ft. high. Distance from floor to underside of roof truss is 30 ft. Aisle width is 5 ft.-4 in.



Crane with operator, who rides with carriage, emerging from aisle with loaded stock tray.

Edgcomb Steel of New England, Inc. warehouses 3500 different items of steel, stainless steel, brass, and aluminum bar stock in an area 60 feet wide, 27 feet high, and 160 feet long.

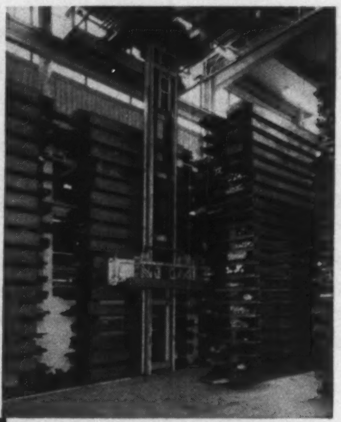
ONE man and a "TRAK-RAK" Crane serve the five double rows and two single rows of "Christmas Tree" racks which hold 2700 storage trays. Edgcomb processes approximately 2500 to 3000 orders per month, and the company reports very favorable reductions in operating costs and faster order processing and delivery.

Edgcomb's "TRAK-RAK" Crane has a traveling bridge (Photo 1) which spans the storage bay, and an overhead trolley from which is suspended an electrically operated rotating column equipped with a carriage for handling the storage trays. All operations of the crane and carriage, which rotates, moves toward or away from the racks, and raises or lowers on the column, are controlled by the operator who rides with the carriage. Safety switches prevent the column from running into a rack and permit full rotation only when the unit is safely beyond the end of the racks.

Hundreds of "TRAK-RAK" installations, designed to meet the user's particular requirements are in use today. They are handling many types of material and loads with great speed and economy. Specific advantages the "TRAK-RAK" System of vertical storage and handling brings to the user are:

1. **Maximum utilization of the cube to permit storing and handling more material in less floor area.**
2. **Faster material movement in and out of storage.**
3. **Reduction in personnel and lower labor costs.**
4. **Improved safety, better housekeeping, precise inventory control.**

Take the first step toward faster, more efficient material storage and handling now. Write for complete details on "TRAK-RAK." Chicago Tramrail Engineers are available to discuss your handling problem with you at any time—and at no obligation to you.



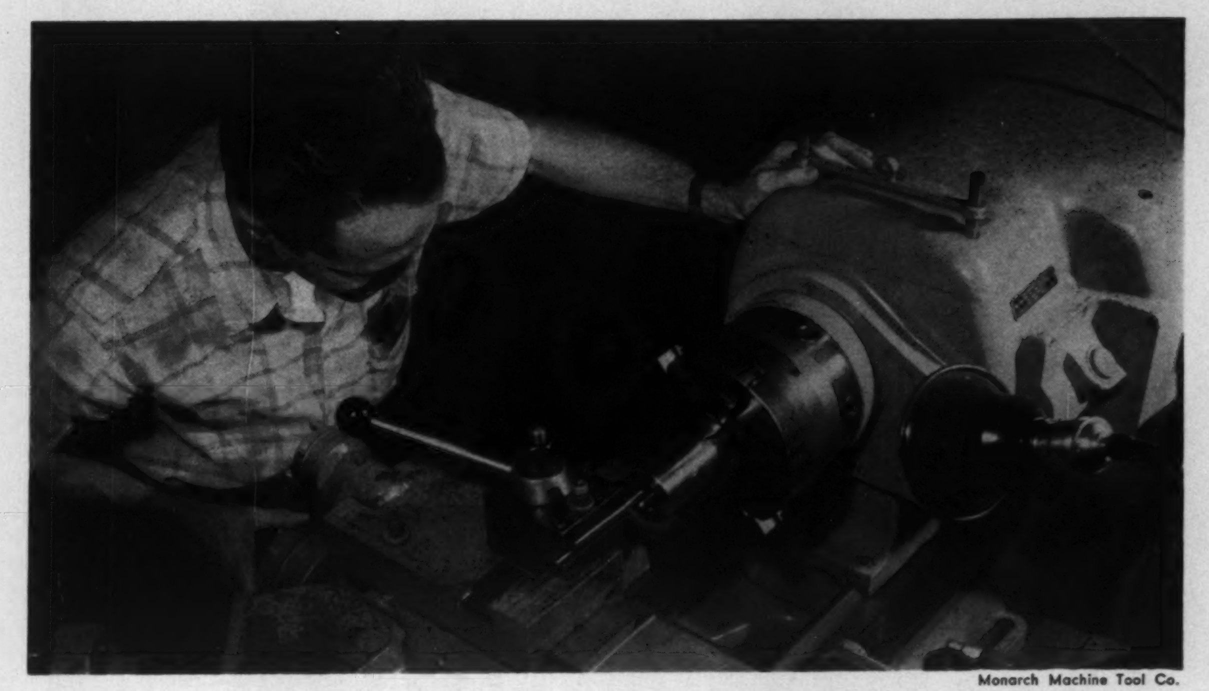
Picking up or depositing stock trays on the rack is a fast, safe operation. Trays and rack sections are color coded for quick location and identification.

cTc

CHICAGO TRAMRAIL CORPORATION

1312 SOUTH KOSTNER AVENUE • CHICAGO 23, ILLINOIS

Specialists in the design, manufacture and installation of material handling systems for steel warehouses and other industries.



Monarch Machine Tool Co.

The IRON AGE Directory of

Tool Steels and Carbides

■ To help users of tool and die steels and carbides in their selection problems, The IRON AGE has already published this directory in 27 editions. To produce this revised 28th edition it was necessary to make nearly 1000 changes—additions, deletions, revisions.

We have added a new cross-index of tool steels by type, brand name and producer. You will also find charts with data on physical properties, forging and heat treating temperatures, machinability, toughness and the like.

These data were compiled by and are published with the permission of the American Iron and Steel Institute. Chemistries shown are for identification only; they are not specifications because steels, even of the same type, vary somewhat among producers.

In FIVE SECTIONS:

1. Properties—Tool Steels
2. Cross-Index—Tool Steels
3. Tool Steel Brands
4. Carbide Brands
5. Producers and Distributors

Classification of Tool Steels by Type

Water Hardening Tool Steels

	Symbol W							SHOCK RESISTING TOOL STEELS Symbol S
	Type W1	*Type W2*	*Type W3*	*Type W4*	*Type W5*	*Type W6*	*Type W7*	*Type S1*
C	.60-1.40	.60-1.40	1.00	.60-1.40	1.10	1.00	1.00	.50
Si								
Mn								
Cr				.25	.50	.25	.50	1.50
Ni								
Mo								
W								2.50
V		.25	.50			.25	.20	
Co								
Cb								
FORGING (a)								
Start forging at °F	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1850-2050
Do not forge below °F	1500	1500	1500	1500	1500	1500	1500	1600
NORMALIZING (b) °F	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	Do not normalize
ANNEALING (c)								
Temperature °F	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1450-1500
Rate of cooling, °F max. per hour	75	75	75	75	75	75	75	50
Approx. hardness, Brinell	159-202	159-202	163-202	159-202	163-202	163-202	163-202	183-229 (h)
HARDENING								
Rate of heating	Slowly (g)	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly
Preheat temperature °F		(g)	(g)	(g)	(g)	(g)	(g)	
Hardening temperature °F	1400-1550 (e)	1400-1550 (e)	1400-1550 (e)	1400-1550 (e)	1400-1550(e)	1400-1550 (e)	1400-1550 (e)	1650-1800
Time at temperature, minutes	10-30	10-30	10-30	10-30	10-30	10-30	10-30	15-45
Quenching medium	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Oil
TEMPERING TEMPERATURE °F	300-650	300-650	300-650	300-650	300-650	300-650	300-650	400-1200
APPROX. HARDNESS, ROCKWELL C	65-50	65-50	65-50	65-50	65-50	65-50	65-50	58-40
DEPTH OF HARDENING	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Medium
NONDEFORMING PROPERTIES	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
SAFETY IN HARDENING	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good
TOUGHNESS	Good (f)	Good (f)	Good	Good (f)	Good (f)	Good (f)	Good (f)	Very good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
WEAR RESISTANCE	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair*
MACHINABILITY	Best	Best	Best	Best	Best	Best	Best	Fair
RESISTANCE TO DECARBURIZATION	Best	Best	Best	Best	Best	Best	Best	Fair to good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

*** If carburized, very good.**

Shock Resisting Tool Steels

Cold Work Tool Steels

	Symbol S				Symbol O, Oil Hardening Types				Symbol A, Medium Alloy Air Hardening Types
	Type S2	*Type S3*	*Type S4*	*Type S5*	*Type O1*	*Type O2*	*Type O6*	*Type O7*	*Type A2*
C	.50	.50	.55	.55	.90	.90	1.40	1.20	1.00
Si	1.00		2.00	2.00			1.00		
Mn			.80	.80	1.00	1.60			
Cr		.75			.50			.75	5.00
Ni									
Mo	.50			.40			.25		1.00
W		1.00			.50			1.75	
V									
Co									
Cb									
FORGING (a)									
Start forging at °F	1850-2050	1850-2050	1850-2050	1850-2050	1800-1950	1800-1925	1950	1800-2000	1850-2000
Do not forge below °F	1600	1600	1600	1600	1550	1550	1500	1600	1650
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not	1600	1550	1600	1650	Do not
ANNEALING (c)									
Temperature °F	1400-1450	1450-1500	1400-1450	1400-1450	1400-1450	1375-1425	1450	1450-1500	1550-1600
Rate of cooling, °F max. per hour	50	50	50	50	50	50	20	50	40
Approx. hardness, Brinell	192-217	183-212	192-229	192-229	183-212	183-212	217 Max.	192-217	202-229
HARDENING									
Rate of heating	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly
Preheat temperature °F	1200 (i)	1200 (i)	1200	1400	1200	1200		1200	1450
Hardening temperature °F	1550-1650	1500-1600	W or B: 1600-1700 Oil: 1650-1750	1600-1700	1450-1500	1400-1475	1450-1550	W: 1450-1525 O: 1550-1625	1700-1800
Time at temperature, minutes	Do not soak	10-30	Do not soak	Do not soak	10-30	Do not soak	Equalize	10-30	20-45 (j)
Quenching medium	Brine or water	Brine or water	Oil or water	Oil	Oil	Oil	Oil	Oil or water	Air
TEMPERING TEMPERATURE °F	300-800	300-600	350-800	350-800	300-500	300-500	300-600	325-550	350-1000
APPROX. HARDNESS, ROCKWELL C	60-50	59-50	60-50	60-50	62-57	62-57	63-58	64-58	62-57
DEPTH OF HARDENING	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Deep
NONDEFORMING PROPERTIES	Poor	Poor	W: Poor O: Fair	Fair	Very good	Very good	Very good	W: Poor O: Very good	Best
SAFETY IN HARDENING	Poor	Poor	W: Poor O: Good	Good	Very good	Very good	Very good	W: Poor O: Very good	Best
TOUGHNESS	Best	Good	Best	Best	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Poor	Fair
WEAR RESISTANCE	Fair	Fair	Fair	Fair	Good	Good	Very good	Good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Good	Good	Very good	Good	Fair
RESISTANCE TO DECARBURIZATION	Poor	Fair	Poor	Poor	Good	Good	Good	Good	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

Cold Work Tool Steels

	Symbol A, Medium Alloy Air Hardening Types			Symbol D, High Carbon-High Chromium Types					
	Type A4	*Type A5*	*Type A6*	*Type A7*	*Type D1*	*Type D2*	*Type D3*	*Type D4*	*Type D5*
C	1.00	1.00	.70	2.25	1.00	1.50	2.25	2.25	1.50
Si									
Mn	2.00	3.00	2.00						
Cr	1.00	1.00	1.00	5.25	12.00	12.00	12.00	12.00	12.00
Ni									
Mo	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
W				1.00*					
V				4.75					
Co									3.00
Cb									
FORGING (a)									
Start forging at °F	1850-2000	1850-2000	1900-2050	1925-2100	1850-2000	1850-2000	1850-2000	1850-2000	1850-2000
Do not forge below °F	1650	1600	1600	1800	1700	1700	1700	1700	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not	Do not	Do not	Do not	Do not	Do not
ANNEALING (c)									
Temperature °F	1360-1400	1360-1400	1350-1375	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	25	25	20	25	50	50	50	50	50
Approx. hardness, Brinell	200-241	228-255	217-248	235-262	207-248	217-255	217-255	217-255	223-255
HARDENING									
Rate of heating	Slowly	Slowly	Slowly	Very slowly	Very slowly	Very slowly	Very slowly	Very slowly	Very slowly
Preheat temperature °F	1250	1100	1200	1500	1500	1500	1500	1500	1500
Hardening temperature °F	1500-1600	1450-1550	1525-1600	1750-1800	1775-1850	1800-1875	1700-1800	1775-1850	1800-1875
Time at temperature, minutes	15-90	15-45	20-45	30 to 60 (j)	15-45 (j)	15-45 (j)	15-45 (j)	15-45 (j)	15-45 (j)
Quenching medium	Air	Air	Air	Air	Air	Air	Oil	Air	Air
TEMPERING TEMPERATURE °F	300-800	300-800	300-800	300-1000	400-1000	400-1000	400-1000	400-1000	400-1000
APPROX. HARDNESS, ROCKWELL C	62-54	60-54	60-54	67-57	61-54	61-54	61-54	61-54	61-54
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Best	Best	Best	Best	Best	Best	Very good	Best	Best
SAFETY IN HARDENING	Best	Best	Best	Best	Best	Best	Good	Best	Best
TOUGHNESS	Fair	Fair	Fair	Poor	Fair	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Fair	Fair	Good	Fair	Good	Good	Good	Good
WEAR RESISTANCE	Good	Good	Good	Best	Very good	Best	Best	Best	Best
MACHINABILITY	Fair to poor	Fair to poor	Fair to poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO DECARBURIZATION	Good to fair	Good to fair	Good to fair	Fair	Fair	Fair	Fair	Fair	Fair

* At producer's option.

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

Cold Work Tool Steels

Hot Work Tool Steels

	Symbol D, High Carbon-High Chromium Types		Symbol H Chromium Base Types					
	Type D6	*Type D7*	*Type H11*	*Type H12*	*Type H13*	*Type H14*	*Type H15*	*Type H16*
C	2.25	2.35	.35	.35	.35	.40	.40	.55
Si	1.00							
Mn								
Cr	12.00	12.00	5.00	5.00	5.00	5.00	5.00	7.00
Ni								
Mo		1.00	1.50	1.50	1.50		5.00	
W	1.00			1.50		5.00		7.00
V		4.00	.40	.40	1.00			
Co								
Cb								
FORGING (a)								
Start forging at °F	1850-2000	2050-2125	1950-2100	1950-2100	1950-2100	1950-2150	1900-2100	1950-2150
Do not forge below °F	1700	1800	1650	1650	1650	1700	1650	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1550-1650	1550-1650	1550-1650	1600-1650	1550-1600	1600-1650
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	217-255	235-262	192-229	192-229	192-229	207-235	207-229	212-241
HARDENING								
Rate of heating	Very slowly	Very slowly	Moderately from Preheat	Moderately from Preheat	Moderately from Preheat	Moderately from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1500	1500	1500	1500	1500	1500	1500	1500
Hardening temperature °F	1700-1750	1850-1950	1825-1875	1825-1875	1825-1900	1850-1950	2100-2300	2050-2150
Time at temperature, minutes	15-45 (j)	30-60 (j)	15-40 (j)	15-40 (j)	15-40 (j)	15-40 (j)	Do not soak	Do not soak
Quenching medium	Oil	Air	Air	Air	Air	Air	Air or oil	Air or oil
TEMPERING TEMPERATURE °F	400-1000	300-1000	1000-1200	1000-1200	1000-1200	1100-1200	1100-1200	1050-1250
APPROX. HARDNESS, ROCKWELL C	61-54	65-58	54-38	55-38	53-38	47-40	49-36	60-45
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Very good	Best	Very good	Very good	Very good	Good	Air: Good Oil: Fair	Good
SAFETY IN HARDENING	Good	Best	Best	Best	Best	Best	Fair	Good
TOUGHNESS	Poor	Poor	Good	Good	Good	Good	Good	Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Good	Good	Good	Good	Good	Good	Good	Good
WEAR RESISTANCE	Best	Best	Fair	Fair	Fair	Fair	Fair	Fair
MACHINABILITY	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

Hot Work Tool Steels

Symbol H

Tungsten Base Types

Molybdenum

	Type H20	Type H21	Type H22	Type H23	Type H24	Type H25	Type H26	Type H41
C	.35	.35	.35	.30	.45	.25	.50	.65
Si								
Mn								
Cr	2.00	3.50	2.00	12.00	3.00	4.00	4.00	4.00
Ni								
Mo								8.00
W	9.00	9.00	11.00	12.00	15.00	15.00	18.00	1.50
V							1.00	1.00
Co								
Cb								
FORGING (a)								
Start forging at °F	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1900-2050
Do not forge below °F	1650	1650	1650	1800	1750	1700	1750	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normaliz	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1500-1600
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	207-235	207-235	207-235	213-255	217-241	207-235	217-241	207-235
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1500	1500	1500	1550	1500	1500	1600	1350-1550
Hardening temperature °F	2000-2200	2000-2200	2000-2200	2200-2325	2000-2250	2100-2300	2150-2300	2000-2175
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	Do not soak
Quenching medium	Air or oil	Air or oil	Air or oil	Air or oil	Air or oil	Air or oil	S, O or A	O, A or S
TEMPERING TEMPERATURE °F	1100-1250	1100-1250	1100-1250	1200-1500	1050-1200	1050-1250	1050-1250	1050-1200
APPROX. HARDNESS, ROCKWELL C	54-36	54-36	52-39	47-30	55-45	44-35	58-43	60-50
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Salt, air: Good Oil: Fair	Salt, air: Good Oil: Fair
SAFETY IN HARDENING	Good	Good	Good	Good	Good	Good	Good	Fair
TOUGHNESS	Good	Good	Good	Fair	Fair	Good	Fair	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Good	Good	Good	Very good	Very good	Very good	Very good	Very good
WEAR RESISTANCE	Fair to good	Fair to good	Fair to good	Fair to good	Good	Fair	Good	Good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

Hot Work Tool Steels

Special Purpose

High Speed

Symbol H

Molybdenum Base Types

Symbol F, Carbon Tungsten Types

Symbol M, Molybdenum Base Types

	Type H42	*Type H43*	*Type F1*	*Type F2*	*Type F3*	*Type M1*	*Type M2*	*Type M3*
C	.60	.55	1.00	1.25	1.25	.80	.80	1.00
Si								
Mn								
Cr	4.00	4.00			.75	4.00	4.00	4.00
Ni								
Mo	5.00	8.00				8.00	5.00	5.00
W	6.00		1.25	3.50	3.50	1.50	6.00	6.00
V	2.00	2.00				1.00	2.00	2.70
Co								
Cb								
FORGING (a)								
Start forging at °F	1900-2050	1900-2050	1800-2000	1800-2000	1800-2000	1900-2100	1900-2100	1900-2100
Do not forge below °F	1700	1700	1550	1650	1650	1700	1700	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	1650	1650	1650	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1550-1650	1500-1600	1400-1475	1450-1500	1450-1500	1500-1600	1600-1650	1600-1650
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	207-235	207-235	183-207	207-235	212-248	207-235	212-241	223-255
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Slowly	Slowly	Slowly	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1350-1550	1350-1550	1200	1200	1200	1350-1550	1350-1550	1350-1550
Hardening temperature °F	2050-2225	2000-2175	1450-1600	1450-1600	1450-1600	2150-2225 (l)	2175-2250 (l)	2200-2250 (l)
Time at temperature, minutes	Do not soak	Do not soak	15	15	15	2-5	2-5	2-5
Quenching medium	O, A or S	O, A or S	W or B	W or B	W, B or O	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1050-1200	1050-1200	300-500	300-500	300-500	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)
APPROX. HARDNESS, ROCKWELL C	60-50	58-45	64-60	66-62	66-62	65-60	65-60	66-61
DEPTH OF HARDENING	Deep	Deep	Shallow	Shallow	Shallow	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Salt, air: Good Oil: Fair	Salt, air: Good Oil: Fair	Poor	Poor	Poor	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Poor	Poor	Poor	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Very good	Poor	Poor	Poor	Very good	Very good	Very good
WEAR RESISTANCE	Good	Good	Good	Very good	Very good	Very good	Very good	Very good
MACHINABILITY	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Poor	Good	Good	Good	Poor	Fair	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

High Speed Tool Steels

Symbol M, Molybdenum Base Types

	Type M4	*Type M6*	*Type M7*	*Type M8*	*Type M10*	*Type M15*	*Type M30*	*Type M33*	*Type M34*
C	1.30	.80	1.00	80	.85	1.50	80	.90	.90
Si									
Mn									
Cr	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.75	4.00
Ni									
Mo	4.50	5.00	8.75	5.00	8.00	3.50	8.00	9.50	8.00
W	5.50	4.00	1.75	5.00		6.50	2.00	1.50	2.00
V	4.00	1.50	2.00	1.50	2.00	5.00	1.25	1.15	2.00
Co		12.00				5.00	5.00	8.00	8.00
Cb				1 25					
FORGING (a)									
Start forging at °F	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100
Do not forge below °F	1700	1700	1700	1700	1700	1700	1700	1700	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not	Do not	Do not	Do not	Do not	Do not
ANNEALING (c)									
Temperature °F	1600-1650	1600	1500-1600	1550-1600	1500-1600	1600-1650	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	50	50	50	25-30	50	50	50	50	50
Approx. hardness, Brinell	223-255	248-277	217-255	217-241	207-235	241-277	235-269	235-269	235-269
HARDENING									
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from preheat	Rapidly from Preheat
Preheat temperature °F	1350-1550	1450	1350-1550	1500-1550	1350-1550	1500-1600	1350-1550	1350-1500	1350-1550
Hardening temperature °F	2200-2250 (l)	2150-2200 (l)	2150-2240 (l)	2200-2300 (l)	2150-2225 (l)	2175-2250 (l)	2200-2250 (l)	2200-2250	2200-2250 (l)
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2 to 5	2-5
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1200 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)
APPPOX. HARDNESS, ROCKWELL C	66-61	66-61	66-61	65-60	65-60	68-63	65-60	65-60	65-60
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Good	Good	Good	Good	Good	Good	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Very good	Very good	Very good	Very good	Best	Best	Best	Best
WEAR RESISTANCE	Best	Very good	Very good	Very good	Very good	Best	Very good	Very good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

High Speed Tool Steels

	Symbol M, Molybdenum Base Types		Symbol T, Tungsten Base Types					
	Type M35	*Type M36*	*Type T1*	*Type T2*	*Type T3*	*Type T4*	*Type T5*	*Type T6*
C	.80	.80	.70	.80	1.05	.75	.80	.80
Si								
Mn								
Cr	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50
Ni								
Mo	5.00	5.00						
W	6.00	6.00	18.00	18.00	18.00	18.00	18.00	20.00
V	2.00	2.00	1.00	2.00	3.00	1.00	2.00	1.50
Co	5.00	8.00				5.00	8.00	12.00
Cb								
FORGING (a)								
Start forging at °F	1900-2100	1900-2100	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150
Do not forge below °F	1700	1700	1750	1750	1750	1750	1800	1800
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	235-269	235-269	217-255	223-255	229-269	228-269	235-275	248-293
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1350-1550	1350-1550	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600
Hardening temperature °F	2225-2275 (l)	2225-2275 (l)	2300-2375 (l)	2300-2375 (l)	2250-2325 (l)	2300-2375 (l)	2325-2400 (l)	2325-2400 (l)
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)
APPROX. HARDNESS, ROCKWELL C	65-60	65-60	65-60	66-61	65-60	66-62	65-60	65-60
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Good	Good	Good	Good	Good	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Good	Good	Good	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Best	Best	Very good	Very good	Very good	Best	Best	Best
WEAR RESISTANCE	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Poor	Poor	Good	Good	Good	Fair	Poor	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

High Speed Tool Steels

Special Purpose Tool Steels

Symbol T, Tungsten Base Types

Symbol L, Low Alloy Types

	Type T7	*Type T8*	*Type T9*	*Type T15*	*Type L1*	*Type L2*	*Type L3*	*Type L4*
C	.75	.75	1.20	1.50	1.00	.50-1.10	1.00	1.00
Si								
Mn								.60
Cr	4.00	4.00	4.00	4.00	1.25	1.00	1.50	1.50
Ni								
Mo								
W	14.00	14.00	18.00	12.00				
V	2.00	2.00	4.00	5.00		.20	.20	.25
Co		5.00		5.00				
Cb								
FORGING (a)								
Start forging at °F	1950-2150	1950-2150	1950-2150	1950-2150	1800-2000	1800-2000	1800-2000	1800-2000
Do not forge below °F	1750	1750	1800	1800	1650	1550	1550	1550
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	1650	1600-1650	1650	1650
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1425-1475	1400-1450	1450-1500	1425-1475
Rate of cooling, °F max. per hour	50	50	50	50	50	Slowly in furnace	50	50
Approx. hardness, Brinell	217-255	228-255	235-277	241-277	179-207	163-196	174-201	179-207
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Slowly	Slowly	Slowly	Slowly
Preheat temperature °F	1500-1600	1500-1600	1500-1600	1500-1600				
Hardening temperature °F	2300-2350 (l)	2300-2375 (l)	2275-2325 (l)	2200-2300 (l)	1450-1550	W: 1450-1550 O: 1550-1700	W: 1425-1500 O: 1500-1600	1475-1600
Time at temperature, minutes	2-5	2-5	2-5	2-5	10-30	10-30	10-30	10-30
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	Oil or water	Oil or water	Oil or water	Oil or water
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1200 (k)	300-600	300-1000	300-600	300-600
APPROX. HARDNESS, ROCKWELL C	65-60	65-60	66-61	68-63	64-56	63-45	64-56	64-56
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Medium	Medium	Medium	Medium
NONDEFORMING PROPERTIES	Good	Good	Good	Good	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Fair
SAFETY IN HARDENING	Good	Fair	Fair	Fair	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Good	W: Poor O: Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Fair	Very good (f)	Fair	Fair
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Best	Very good	Best	Poor	Poor	Poor	Poor
WEAR RESISTANCE	Very good	Very good	Best	Best	Good	Fair	Good	Good
MACHINABILITY	Fair	Fair	Fair	Fair	Good	Good	Good	Good
RESISTANCE TO DECARBURIZATION	Good	Fair	Good	Fair	Good	Good	Good	Good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

Special Purpose Tool Steels

	Symbol L, Low Alloy Types.			Symbol P, Mold Steels	Low Carbon Types			
	Type L5	*Type L6*	*Type L7*	*Type P1*	*Type P2*	*Type P3*	*Type P4*	*Type P5*
C	1.00	.70	1.00	.10	.07	.10	.07	.10
Si								
Mn	1.00		.35					
Cr	1.00	.75	1.40		2.00	.60	5.00	2.25
Ni		1.50			.50	1.25		
Mo	.25	.25*	.40		.20			
W								
V								
Co								
Cb								
		*At producer's option						
FORGING (a)								
Start forging at °F	1800-2000	1800-2000	1800-2000	2200-2350 or 1450-1550*	1850-2050	1850-2050	1850-2050	1850-2050
Do not forge below °F	1550	1550	1550	1900 or 1250*	1550		1600	1550
NORMALIZING (b) °F	1650	1600	1650	Not required	Not required	Not required	Do not normalize	Not required
ANNEALING (c)								
Temperature °F	1425-1475	1400-1450	1450-1500	1350-1650	1350-1500	1350-1500	1600-1650	1550-1600
Rate of cooling, °F max. per hour	50	50	50	50	50	Slow in fce.	25	40
Approx. hardness, Brinell	183-223	183-212	183-212	81-100	103-123	109-137	116-128	105-110
HARDENING								
Rate of heating	Slowly	Slowly	Slowly					
Preheat temperature °F				1650-1700	1650-1700	1650-1700	1775-1825	1650-1700
Hardening temperature °F	1450-1600	1450-1550	1500-1600	1450-1475**	1525-1550**	1475-1525**	1775-1825**	1550-1600**
Time at temperature, minutes	10-30	10-30	10-30	15	15	15	15	15
Quenching medium	Oil	Oil	Oil	Water or brine	Oil	Oil	Air	Oil or water
TEMPERING TEMPERATURE °F	300-600	300-1000	300-600	300-500	300-500	300-500	300-500	300-500
APPROX. HARDNESS, ROCKWELL C	64-56	62-45	64-56	64-58***	64-58***	64-58***	64-58***	64-50***
DEPTH OF HARDENING	Medium	Medium	Medium	Shallow	Shallow	Shallow	Shallow	Shallow
NONDEFORMING PROPERTIES	Good	Good	Good	Poor	Good	Good		Good
SAFETY IN HARDENING	Good	Good	Good	Fair	Good	Good		Good
TOUGHNESS	Fair	Very good	Fair	Good	Good	Good		Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor
WEAR RESISTANCE	Good	Fair	Good	Good	Good	Good		Good
MACHINABILITY	Good	Fair	Good	Poor	Good	Fair		Fair
RESISTANCE TO DECARBURIZATION	Good	Good	Good	Good	Good	Good		Good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

*** If carburized, very good.**
**** After carburizing.**
***** Carburized case hardness.**

Special Purpose Tool Steels

Symbol P, Mold Steels

	Low Carbon	Other
	Type P6	*Type P20*
C	.10	.30
Si		
Mn		
Cr	1.50	.75
Ni	3.50	
Mo		.25
W		
V		
Co		
Cb		
FORGING (a)		
Start forging at °F	1950-2150	1850-2050
Do not forge below °F	1700	1600
NORMALIZING (b) °F	Not required	1650
ANNEALING (c)		
Temperature °F	1550	1400-1450
Rate of cooling, °F max. per hour	30	50
Approx. hardness, Brinell	207	150-180
HARDENING		
Rate of heating		
Carburizing temperature °F	1650-1700	1600-1650
Hardening temperature °F	1450-1500**	1500-1600**
Time at temperature, minutes	15	15
Quenching medium	Oil	Oil
TEMPERING TEMPERATURE °F	300-450	300-500
APPROX. HARDNESS, ROCKWELL C	58-61***	64-58***
DEPTH OF HARDENING	Deep	Medium
NONDEFORMING PROPERTIES	Good	Good
SAFETY IN HARDENING	Good	Good
TOUGHNESS	Good	Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Poor
WEAR RESISTANCE	Good	Fair to good
MACHINABILITY	Fair	Good
RESISTANCE TO DECARBURIZATION	Good	Good

** After carburizing.

*** Carburized case hardness.

Notes to Charts in Section I

a. The temperature at which to start forging is given as a range, the higher side of which should be used for large sections and heavy or rapid reductions, and the lower side for smaller sections and lighter reductions. As the alloy content of the steel increases, the time of soaking at forging temperature increases proportionately. Likewise, as the alloy content increases, it becomes more necessary to cool slowly from the forging temperature. With very high alloy steels, such as high speed steels and air hardening steels, this slow cooling is imperative in order to prevent cracking and to leave the steel in a semisoft condition. Either furnace cooling or burying in an insulating medium, such as lime, mica, or silocel, is satisfactory.

b. The length of time the steel is held, after being uniformly heated through at the normalizing temperature, varies from about 15 minutes for a small section to about 1 hour for large sizes. Cooling from the normalizing temperature is done in still air. The purpose of normalizing after forging is to refine the grain structure and to produce a uniform structure throughout the forging. Normalizing should not be confused with low temperature (about 1200° F) annealing used for the relief of residual stresses resulting from heavy machining, bending, and forming.

c. The annealing temperature is given as a range, the upper limit of which should be used for large sections and the lower limit for smaller sections. The length of time the steel is held, after being uniformly heated through at the annealing temperature, varies from about one hour for light sections and small furnace charges of carbon or low alloy tool steel, to about four hours for heavy sections and large furnace charges of high alloy steel.

d. Forging, normalizing, and annealing temperatures of carbon tool steels are given as ranges because they vary with carbon content. The following temperatures are recommended:

Forging

0.50 to 1.25% C: the range given
1.25 to 1.40% C: the low side of the range

Normalizing

0.60 to 0.75% C: 1500° F
0.75 to 0.90% C: 1450° F
0.90 to 1.10% C: 1600° F
1.10 to 1.40% C: 1600 to 1700° F

Annealing

0.60 to 0.90% C: 1360 to 1400° F
0.90 to 1.40% C: 1400 to 1450° F

e. Varies with carbon content as follows:
0.60-0.80% C: 1450-1550° F
0.85-1.05% C: 1425-1550° F
1.10-1.40% C: 1400-1525° F

f. Toughness decreases with increasing carbon content and depth of hardening.

g. For large tools and tools having intricate sections, preheating at 1050-1200° F is recommended.

h. For steel S1: for 0.25% silicon type, 183-207 Brinell; for 1.00% silicon type, 207-229 Brinell.

i. For steels S2 and S3: preferable for large tools to minimize decarburization.

j. Times given apply to open furnace heat treatment. For pack hardening a common rule is to heat for ½ hour per inch of cross section of the pack.

k. Double tempering recommended.

l. When the high temperature heating is carried out in a salt bath, the range of temperatures should be about 25° F lower than that given in this line.

O: Oil quench
A: Air cool
S: Salt bath quench
B: Brine quench
W: Water quench

Cross Index of Steels by Type and Brands

The following steels are listed alphabetically in Section 3. They are arranged here by American Iron and Steel Institute symbols.

See Section 1 for their chemistries, physical properties, etc.

Water Hardening

W1

11 Comet	Carpenter
11 Special	Carpenter
A70	Heppenstall
A110	Heppenstall
A. S. Blue Label	Ackerlind
A. S. V.	Firth Sterling
Achorn Best Carbon	Achorn
Achorn Carbon Drill Rod	Achorn
Achorn Cold Drawn	Achorn
Achorn Cold Heading Die	Achorn
Achorn Extra Carbon	Achorn
Achorn Extra Chisel	Achorn
Achorn Spring Steel Sheet	Achorn
Achorn Standard Carbon	Achorn
Achorn Tool Steel Sheet	Achorn
Apex Drill Rods (Polished)	Lehigh
Atlantic Standard	Atlantic
Atlas Alpha-8	Atlas
Atlas Refined-8	Atlas
Atlas Refined-10	Atlas
Atlas X-10	Atlas
Atlas X-12	Atlas
Atlas XX-95	Atlas
Atsco	Atlantic
Atsco Extra	Atlantic
Autodie	Columbia
Best Carbon	Boyd-Wagner
Black-Diamond	Crucible
Carbon	Faitoute
Colonial No. 14	Vanadium-Alloys
Columbia Autodie	Columbia
Columbia Elextrex	Columbia
Columbia Extra	Columbia
Columbia Extra Headerdie	Columbia
Columbia Special	Columbia
Columbia Standard	Columbia
Commando Drill Rod	Atlas
Conqueror	Lehigh
Conqueror Hollow	Lehigh
Crescent Special	Crucible
Darwin Special	Darwin & Milner
Darwin Standard Carbon	Darwin & Milner
Delaware Extra	Delaware
Delaware Standard	Delaware
Diamond "E" Polished Drill Rod	Edgcomb
Dukane Drill Rod, Rounds	Pittsburgh
Duplex	Faitoute
Extra	Faitoute, Firth Sterling, Kloster, Republic, Ziv
Extra L	Vanadium-Alloys
Extra Tough	U. N. Alloy Steel
Gibraltar	H. Boker
Granada	Crucible
Green Label Drill Rod	Carpenter
GW Extra	Great Western
GW Regular	Great Western
GW Special	Great Western
H-9 Double Header	Carpenter
H & R Carbon	Houghton & Richards
H & R Heading Die	Houghton & Richards
H. S. C. Cold Header Die	Hoyland
H. S. C. Regular	Hoyland
H. S. C. Special	Hoyland
H. S. C. SS Extra	Hoyland
Hawk Brand	Hawkridge
Hawk Cold Header Die	Hawkridge
Hawk Standard	Hawkridge
Jamison Special	Jamison
LaBelle Cold Striking	Crucible
LaBelle Extra	Crucible
Lion	Jessop
Lion Extra	Jessop
Macco Broaching and Channeller	McDonald
Macco Extra	McDonald
Macco Solid	McDonald
Macco Special W.H.	McDonald
Macco Standard	McDonald
Maple Leaf	Atlas
Monaca Drill Rod, Rounds	Pittsburgh
New Process Cold Header	Jessop
NonAnnealed Standard Carbon	Coulter
NonExcelled Extra Carbon	Coulter
Orange Label	Milne
P-B Drill Rod	Patriarche & Bell
Pompton	Allegheny-Ludlum
Quality Carbon Drill Rod	Latrobe
Red Label	Milne
Red Star Tool	Vanadium-Alloys
Regular	Ziv
Reliance	Pittsburgh
Sanderson Extra	Crucible
Simonds Blue Label Extra	Simonds
Simonds Diamond "S" Standard	Simonds
Simonds Green Label	Simonds
Simonds Red Label Special	Simonds
Special	Braeburn, Faitoute, Firth Sterling, Kloster, Republic, Universal-Cyclops, Ziv
Special A. S. V.	Firth Sterling
Special, Extra & Standard Carbon	Latrobe
Special XX	Firth Sterling
S.S.C.	Darwin & Milner
Standard	Kloster, Universal-Cyclops, Republic
Sterling	Firth Sterling
Sterling XX	Firth Sterling
Tool Grade	Republic
UHB	Uddeholm
UHB Extra	Uddeholm
Utility	Lehigh
Victor Drill Rod	Crucible
Vulcan-Kidd Ajax Drill Rod	Vulcan-Kidd
Vulcan-Kidd Extra	Vulcan-Kidd
Vulcan-Kidd Pitt	Vulcan-Kidd
Vulcan-Kidd Special	Vulcan-Kidd
Vulcan-Kidd Striking Die	Vulcan-Kidd
Vulcan Tru-Cor Drill Rod	Vulcan-Kidd
Washington	Jessop
WATERcrat	Marshall
White Label	Swedish-American, Milne
X	Bethlehem
XCL	Bethlehem
XX	Bethlehem
Yellow Label	Ackerlind
Zivco	Ziv

W2

2V72 Cartos	Heppenstall
2V90 Cartos	Heppenstall
11 Special-Vanadium	Carpenter
A. S. White Label	Ackerlind
Achorn V85	Achorn
Alva Extra	Crucible
Atlas Special Alloy-8	Atlas
Atlas Special Alloy-10	Atlas
Atsco Special	Atlantic
Best and Superior	Bethlehem
Blue Label	Peninsular
Champion Econo #1-V	Champion
Colonial No. 7	Vanadium-Alloys
Draco Special	Universal-Cyclops
Draco Standard	Universal-Cyclops
Dumost 1	Republic
Dumost 2	Republic
Durmost 3	Republic
Dumost 16	Republic
Elvandi	Vanadium-Alloys
Ex. S	U. N. Alloy Steel
Extra V	Firth Sterling
Grade "A"	Diehl
Granada Vanadium	Crucible
GW Cold Header	Great Western
H & R Vanadium	Houghton & Richards
H. S. C. Cold Header Die	Hoyland
Lion Extra-Vanadium	Jessop
Lion Vanadium	Jessop
Macco B-29 W.H.	McDonald
New Process Cold Header Va	Jessop
Nitro	Carpenter
Python	Allegheny Ludlum
Red Star Vanadium	Vanadium-Alloys
Silvan Star	Firth Sterling
Simonds Blue Label Extra	Simonds
Simonds Diamond "S" Standard	Simonds
Simonds Green Label	Simonds
Simonds Red Label Special	Simonds
Special Draco	Universal-Cyclops
Special V	Braeburn, Firth Sterling
Sterling V	Firth Sterling
UHB-19VA	Uddeholm
UHB-VA	Uddeholm
V. D. Tool Steel	Ryerson
Vanadium Autodie	Columbia
Vanadium Electrex	Columbia
Vanadium Extra	Columbia
Vanadium Standard	Columbia
Vulcan-Kidd Special Vanadium	Vulcan-Kidd
Vulcan-Kidd Vanadium Striking Die	Vulcan-Kidd
Washington Special	Jessop
Zivco Vanadium	Ziv

W3

Colhed	Vanadium-Alloys

W4

14A60 (Semdex)	Heppenstall

14A60 (S-Treated) ..... Heppenstall
Sanderson Special ..... Crucible
Silver Star ..... Firth Sterling
Very Best ..... Boyd-Wagner

W5

27S ..... Universal-Cyclops
Atlas "Q" ..... Atlas
Beacon ..... Edgcomb
CC ..... Republic
Starrett Precision Ground Die Stock W. H. ..... Starrett
Vulcan-Kidd K. R. ..... Vulcan-Kidd
Waterdie Extra ..... Columbia
Waterdie Standard ..... Columbia

W7

H & R Piston .. Houghton & Richards
Hercules ..... Universal-Cyclops
Piston ..... Bethlehem

Shock Resisting

S1

67 Chisel ..... Bethlehem
AO 20 ..... Milne
A. S. No. 7 ..... Ackerlind
Achorn UBC ..... Achorn
Alco M ..... Universal-Cyclops
Alco S ..... Universal-Cyclops
Atha Pneu ..... Crucible
Boker Power Chisel ..... H. Boker
Brown Label ..... Peninsular
Bulldog ..... Pennsylvania
Buster Alloy 50 ..... Columbia
Buster Alloy 60 ..... Columbia
C-V ..... Republic
Chiz-Alloy ..... Kloster
Durax ..... Swedish-American
Durax W2 ..... Marathon
Falcon-4 ..... Atlas
Falcon-6 ..... Atlas
GW 422 Mirycal ..... Great Western
H & R 225 ..... Houghton & Richards
H. S. C. 422 ..... Hoyland
Hickory No. 7 ..... Jamison
Ideor ..... Darwin & Milner
J-4 ..... Ackerlind
J. S. Punch ..... Firth Sterling
KL ..... U. N. Alloy Steel
Macco Foolproof ..... McDonald
Macco Foolproof O. H. ..... McDonald
NonShock Tungsten ..... Coulter
Par-Exc ..... Vanadium-Alloys
Seminole ..... Allegheny Ludlum
Seminole Hard ... Allegheny Ludlum
Seminole Medium .. Allegheny Ludlum
Simonds Commando 47 ..... Simonds
Special 18 ..... Boyd-Wagner
Super Alloy ..... Kloster
T71 ..... Heppenstall
T72 ..... Heppenstall
T74 ..... Heppenstall
Top Notch ..... Jessop
Tuncro ..... Atlantic
UHB-711 ..... Uddeholm
Vibro ..... Braeburn
Vulcan-Kidd Q. A. ..... Vulcan-Kidd
Wizard ..... Ziv
XL Chisel Alloy Tool ..... Latrobe

S2

Delaware S. T. ..... Delaware
H & R Silico ... Houghton & Richards
Monark-1 ..... Atlas
RTS ..... Jessop
Simonds Havoc ..... Simonds
Solar ..... Carpenter
Triton ..... Braeburn
Venango ..... Universal-Cyclops

S3

M-Tungsten ..... Republic
T716 ..... Heppenstall
Vulcan-Kidd Blue Edge .. Vulcan-Kidd

S4

67 ..... Universal-Cyclops
KHSW ..... U. N. Alloy Steel
LaBelle 2-70 ..... Crucible
Macco Sil. Mang. O. H. ..... McDonald
Special Punch ..... Republic
Silman ..... Vanadium-Alloys
Vulcan-Kidd 4870 ..... Vulcan-Kidd

S5

67 ..... Universal-Cyclops
259 ..... Jessop
481 ..... Carpenter
AL 609 ..... Allegheny-Ludlum
Alloy 10 ..... Braeburn
Atsil ..... Atlantic
Bedco Alloy ..... Bedford
BTF Alloy ..... Bedford
Champion 255 ..... Champion
Chimo ..... Firth Sterling
Darwin Extra Tough Darwin & Milner
Delsteel Alloy ..... Delaware
Duredge ..... Boyd-Wagner
GW 280 Tufkut ..... Great Western
H & R 8 ..... Houghton & Richards
H. S. C. 280 ..... Hoyland
Hy-Ten Pneumatic Wheelock, Lovejoy
LaBelle Silicon No. 2 ..... Crucible
MSM ..... Milne
Macco Hard Tuf O. H. ..... McDonald
Magic ..... Jessop
Monark-2 ..... Atlas
Mosil ..... Vanadium-Alloys
NonSpall Punch and Chisel ... Coulter
Omega ..... Bethlehem, Faitoute
Plancher ..... Ziv
R97-Hevi-Duty ..... Heppenstall
Rocket ..... Lehigh
S-362 ..... U. N. Alloy Steel
Shearcut ..... Pennsylvania
Shock-Rite ..... St. Lawrence
Silico Alloy ..... Columbia
Silver Label ..... Peninsular
Simonds Orleans ..... Simonds
Tamco ..... The Tool & Mfg.
UHB Resisto ..... Uddeholm
V-76 ..... Kloster

Cold Work Steels
Oil Hardening

O1

A. S. Green Label ..... Ackerlind
Achorn Oil Hdng. Drill Rod .. Achorn
Achorn Superior Oil Hardening ..... Achorn
Amcoh ..... Milne
Amutit S ..... U. N. Alloy Steel
Arrow Non-Shrinkable. Boyd-Wagner
Atlan ..... Atlantic
B76 ..... Heppenstall
Badger ..... Latrobe
Brown & Sharpe Plain Brown & Sharpe
Brown & Sharpe Ready Mark Brown & Sharpe
BTR ..... Bethlehem
Carpenter O-1 ..... Carpenter
Choyce 77 ..... Champion
Colonial No. 6 ..... Vanadium-Alloys
Crest O. H. ..... St. Lawrence
DoAll Precision Ground Tool & Die ..... DoAll
Exl-Die ..... Columbia
GW "CW Oil" ..... Great Western
H & R Tungsten O. H. Houghton & Richards
H. S. C. CW Oil ..... Hoyland
Hargus ..... Ziv
Invaro 1 ..... Firth Sterling
K-46 O. H. ..... Jamison
Keewatin ..... Atlas
Ketos ..... Hawkridge
Kiski ..... Braeburn
Kloster Swed-Oil ..... Kloster
Macco Royal Crown O. H. .. McDonald
Meridian Die "O" Steels .... Meridian
Microloy Ground Flat Stock. Capewell
Non-Pa-Reil ..... Swedish-American
NonDistort O. H. ..... Coulter
OHT ..... Darwin & Milner
OILcrat ..... Marshall
Oilhard ..... Faitoute
Oil Hardening ..... DoAll
Oilway ..... H. Boker
Saratoga ..... Allegheny-Ludlum
Simonds Teenax 46 ..... Simonds
Simonds Red Streak Flat .... Simonds
Special Oil Hardening ..... Republic
Starrett Precision Ground Die Stock O.H. ..... Starrett
Superior ..... Ackerlind
Swed-Oil ..... Kloster
Tempo ..... Pennsylvania
Tensiloy Oil-Hardening Die .... Allied
Torpedo ..... Lehigh
Truform ..... Jessop
UHB-46 ..... Uddeholm
Utex ..... Diehl
Veresta V ..... Marathon
Veribest Drill Rod ..... Diehl
Vulcan-Kidd Keystone Drill Rod
Vulcan-Kidd Oil-Hard (Mansil) Vulcan-Kidd
Wando ..... Universal-Cyclops
Warplis Drill Rod ..... Pittsburgh
Warplis Ground Flat Stock Pittsburgh
Yellow Label ..... Peninsular

O2

Achorn Mang. Oil ..... Achorn
Arrestite ..... Republic
Deward ..... Allegheny-Ludlum
H & R Oil Hardening Houghton & Richards
H Brand ..... Darwin & Milner
MST ..... U. N. Alloy Steel
Mangano Oil Hardening ..... Latrobe
Ry-Alloy ..... Ryerson
S. O. D. ..... Braeburn
Simonds 864 ..... Simonds
Special Oil Hardening ..... Jessop
Stentor ..... Carpenter
Vulcan-Kidd Non-Shrinkable Vulcan-Kidd

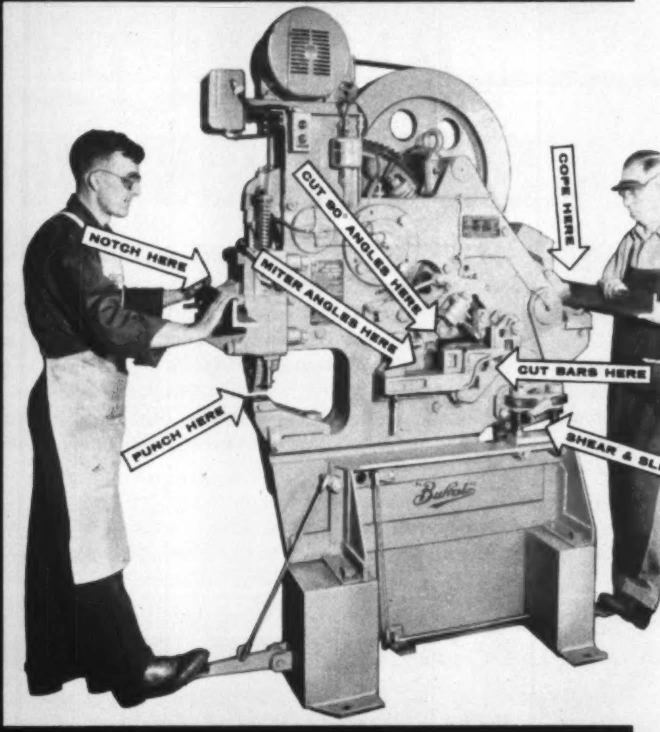
O6

Achorn Graphitic Oil ..... Achorn
Dargraph ..... Darwin & Milner
F. C. EZ Cast-to-Shape (O. H.) Allegheny-Ludlum
Graph-Mo ..... Timken
Halgraph ..... Crucible
Lubri-Die ..... Ziv
Oilgraph ..... Allegheny-Ludlum

O7

67 Tap ..... Bethlehem

(*Continued on page* 285)


NOTCH HERE
CUT 90° ANGLES HERE
MITER ANGLES HERE
COPE HERE
CUT BARS HERE
PUNCH HERE
SHEAR & SLIT HERE
Buffalo

QUALITY-BUILT 'BUFFALO' MACHINE TOOLS

See Them at the
Machine Tool Exposition – 1960

BOOTH 551

SEVEN OPERATIONS – SAME MACHINE

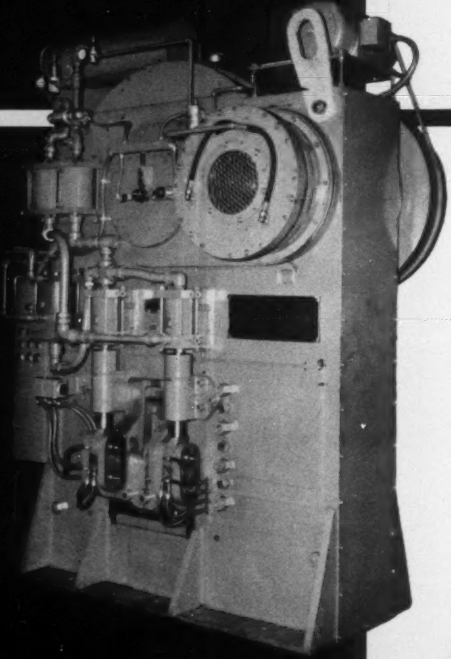
A 'Buffalo' Universal Iron Worker will speed your production and maintenance jobs — cut costs — turn losses into profits.

It can do all the jobs shown — several at the same time — many without changing tools.

This versatile, space-saving machine is quality-built to assure long life with minimum maintenance.

It is available in models and sizes to suit your needs.

Thousands of users call the 'BUFFALO' U. I. W. the most useful machine in their shops. Perhaps you will, too. See it in action at the Machine Tool Exposition. If you're in a hurry for full details, contact your machine tool dealer — or write direct for Bulletin 322.



NEW FOR THE MACHINE TOOL EXPOSITION-1960

NEW 'BUFFALO' 400 BILLET SHEAR

For high speed production billet cutting. Continuous operation at full capacity (within its rating) on any shearable material. Handles mild steel squares to 4", rounds to 4½". Speeds up to 60 strokes per minute. Ram tonnage: 400 tons. Machine stroke: 2". Quick, easy knife changing — both knives are removable from rear. Potential of 18,000 cuts per 8 hr. shift on automatic basis. Welded alloy steel frame has guaranteed minimum strength of 65,000 psi. Push button or foot-operated electrical control. Positive pneumatic oiling system.

The new 'Buffalo' 400 Billet Shear in operation will be one of the most exciting exhibits at the Machine Tool Exposition. See it there . . . write direct for complete facts . . . or call your machine tool dealer.

ESTABLISHED 1877
"Buffalo"
MEMBER N.M.T.B.A.

BUFFALO FORGE

Canadian Blower & Forge

DRILLING • PUNCHING

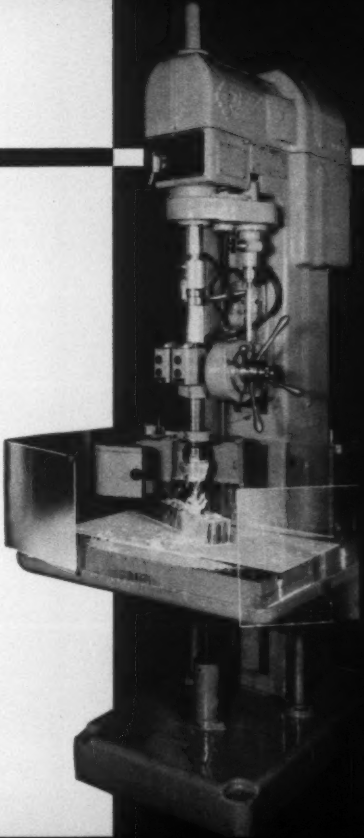
SEE THEM IN OPERATION . . . BOOTH 551

NEW 'BUFFALO' HOLLOW SPINDLE DRILLING MACHINES

Now you can handle formerly "impossible" drilling jobs at production speeds. Successfully drill super-hard titanium, stellite, rene 41, stainless and other exotic metals — quickly and cleanly with the incomparable 'Buffalo' Hollow Spindle RPMster and #18 drilling machines. Coolant flow through spindle, instant speed changes and extra-rugged construction let you realize full potential of hollow "Cold-Point" drills and diamond core bits.

The results are amazing. Productivity increases range to more than 300% in actual production runs. See the new 'Buffalo' Hollow Spindle machines drilling exotic metals and ceramics at the Machine Tool Exposition. We will test-drill a sample of your hard-to-drill metals. Just bring it to the show.

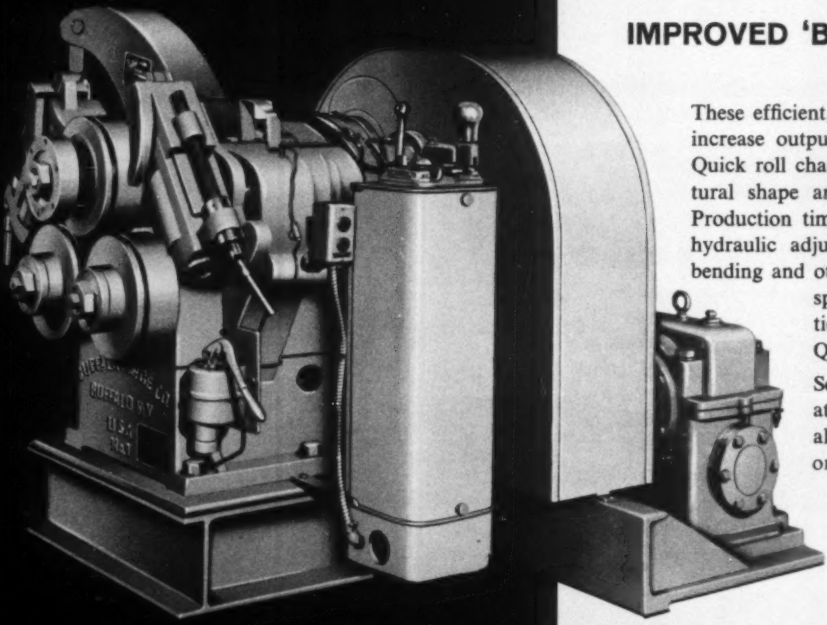
Details available on request.



COMPANY 490 Broadway • Buffalo, N. Y.

Co., Ltd., Kitchener, Ont.

SHEARING • BENDING



IMPROVED 'BUFFALO' BENDING ROLLS

These efficient, sturdily-built machines will cut costs and increase output in your production bending operations. Quick roll changes speed bending of almost every structural shape and size into circles, segments or spirals. Production time can be further reduced up to 30% by hydraulic adjustment on upper roll (optional). Leg-in bending and other specialized jobs are easily handled by special rolls. Choose from horizontal or vertical models in a wide range of capacities. Quality construction assures long life.

See demonstration of 'Buffalo' Bending Rolls at the Machine Tool Exposition. You can also call in your nearby machine tool dealer, or write us direct for Bulletin 352.

See 'BUFFALO' machine tools in action at the Machine Tool Exposition, 1960 . . . BOOTH 551

ESTABLISHED 1877
"Buffalo"
MEMBER N M T B A

Amutit	U. N. Alloy Steel
H & R 60	Houghton & Richards
Para	Universal-Cyclops
Red Star Tungsten	Vanadium-Alloys
Utica	Allegheny-Ludlum
Vulcan-Kidd Hardrite	Vulcan-Kidd

Medium Alloy A.H.

A2

484	Carpenter
A-H5	Bethlehem
A. S. No. 5	Ackerlind
Achorn CVM	Achorn
Air-Chrom	Kloster
Air-Hard	Vanadium-Alloys
Air-Hardening	DoAll
AIRcrat	Marshall
Airkoll	Crucible
Airque	Braeburn
Airque FM	Braeburn
Airtem	Lehigh
Airtreat A. H.	Jamison
Airvan	Firth Sterling
Boko-5—Chrome Die	H. Boker
Bora 5	Marathon
Crest A. H.	St. Lawrence
Cro-mo-loy	Atlas
Delair	Delaware
DoAll Precision Ground Tool & Die Steels	DoAll
Dumore	Ziv
Econo 5	Champion
E-Z-Die Smoothcut	Columbia
F. C. Roloy 2 Cast-to-Shape	Allegheny-Ludlum
GW "CVM"	Great Western
H44	Heppenstall
H & R 80	Houghton & Richards
H. S. C. CVM	Hoyland
Hardnair	Atlantic
Hi-Di 5 NonShrinking	Boyd-Wagner
Kromair	Republic
Krovan	Diehl
Macco 35 A. H.	McDonald
Meridian Die	Meridian
Milnair 5	Milne
Mineor	Darwin & Milner
NonChange A. H.	Coulter
Penair 5	Peninsular
Penn-Air	Pennsylvania
Pittsburgh Air Hardening Ground Flat Stock	Pittsburgh
Sagamore	Allegheny-Ludlum
Sagamore EZ	Allegheny-Ludlum
Select B FM	Latrobe
Simonds Airtrue 51	Simonds
Simonds Red Streak Flat	Simonds
Sparta	Universal-Cyclops
Special K5	U. N. Alloy Steel
Starrett Precision Ground Die Stock AH	Starrett
UHB-151	Uddeholm
Vulcan-Kidd Vuldie	Vulcan-Kidd
Vulcan-Kidd Vuldie FM	Vulcan-Kidd
Windsor	Jessop
Windsor (FM)	Jessop

A4

A. S. No. 121 Improved	Ackerlind
Air-4	Bethlehem
Airaloy	Republic
Airfree A. H.	Jamison
Airloy X Cast-to-Shape	Allegheny-Ludlum
Airmo	Firth Sterling
Vulcan-Kidd Vairloy	Vulcan-Kidd
Vulcan-Kidd-Variloy FM	Vulcan-Kidd

A6

Jess-Air	Jessop
Lo-Air	Universal-Cyclops
Nutherm	Atlas
Orbit	Crucible
Vega	Carpenter

A7

Chromewear	Vanadium-Alloys
E-Z-Die V	Columbia
Sparta CV	Universal-Cyclops

High Carbon-High Chromium

D1

Bora	Marathon
H & R K-2L	Houghton & Richards
Lehigh L	Bethlehem
R45	Heppenstall

D2

404	Republic
610	Carpenter
A. S. Tri-Ack	Ackerlind
Achorn High Production Die	Achorn
Airdi 150	Crucible
Alloy "C"	Ackerlind
Atlan HCC	Atlantic
Atmodie	Columbia
Atmodie Smoothcut	Columbia
Bora Special M	Marathon
CNS 1	Jessop
CNS 1 (FM)	Jessop
Chromdie	Faitoute
Cromovan	Firth Sterling
Darwin 1	Darwin & Milner
Densite AH	Jamison
Dycro	Pennsylvania
F. C. A.H. Cast-to-Shape	Allegheny-Ludlum
FNS & FNS-fm	Atlas
GW 265 High Production	Great Western
H & R K2	Houghton & Richards
H. S. C. 265	Hoyland
Hi-Run	Kloster
Hicro 150	Diehl
High Production	Milne
Hypro	Swedish-American
Hypro 61 A. H.	Boyd-Wagner
Kinite	H. Boker
Lehigh H	Bethlehem
Macco Kromax 1	McDonald
NonAbrade A. H.	Coulter
Ohio Die	Vanadium-Alloys
Olympic	Latrobe
Olympic FM	Latrobe
Ontario	Allegheny-Ludlum
Ontario-EZ	Allegheny-Ludlum
R43-Kleenkut	Heppenstall
S 325	U. N. Alloy Steel
Simonds C.C.M.	Simonds
Superior 3	Braeburn
Superior 3 FM	Braeburn
Tensiloy High Carbon-High Chrome	Allied
Tri-Mo	Uddeholm
Trudie	Champion
Ultradie 3	Universal-Cyclops
Van Cro-12	St. Lawrence
Vulcan-Kidd Alidie	Vulcan-Kidd
Vulcan-Kidd Alidie FM	Vulcan-Kidd
Vulcan-Kidd Croloy	Vulcan-Kidd
White Label	Peninsular

D3

A. S. Vi-Chrome	Ackerlind
Achorn High Production Die 225	Achorn
Atlas NN & NN-fm	Atlas
Bora 12	Marathon
CNS 2	Jessop
Double Six	Milne
GSN FM	Latrobe
GW 265-H High Production	Great Western
H & R K	Houghton & Richards
H. S. C. 265-H	Hoyland
Hampden	Carpenter
Hicro 200	Diehl
Huron	Allegheny-Ludlum
Huron EZ	Allegheny-Ludlum
Hyco	Lehigh
Hypro 62 O. H.	Boyd-Wagner
Kapo	Kloster
Lehigh S	Bethlehem
Neor	Darwin & Milner
NonAbrade O. H.	Coulter
Simonds 12225	Simonds
Special K	U. N. Alloy Steel
Superdie	Columbia
Superior 1	Braeburn
Superior 1 FM	Braeburn
Triple Die	Firth Sterling
Tri-Van	Uddeholm
Ultradie 1	Universal-Cyclops
Vulcan Hi-Pro	Vulcan-Kidd
White Label S	Peninsular

D4

A.T. 2	Braeburn
CNS-3	Jessop
Crocar	Vanadium-Alloys
HYCC	Crucible
Special K.RM	U. N. Alloy Steel
Ultradie 1M	Universal-Cyclops

D5

3-C Special	Jessop
Cobalt Chrome FM	Latrobe
Cromoco	Firth Sterling
Double Seven	Milne
EK-81	Universal-Cyclops
F. C. 66	Allegheny-Ludlum
F. C. 66 Cast-to-Shape	Allegheny-Ludlum
H & R 61	Houghton & Richards
Macco Kromax 2	McDonald
NonAbrade Cobalt	Coulter
PRK-33	Darwin & Milner
Special KCO	U. N. Alloy Steel
Super Kinite	H. Boker
Superior 2	Braeburn
Trudie Special	Champion

D6

A. S. Vi-Chrome W	Ackerlind
Tri-Tung	Uddeholm

D7

BR-4 FM	Latrobe
H & R K 3	Houghton & Richards
Tru-Wear	Jessop
Tru-Wear FM	Jessop

Hot Work Steels

Chromium Base

H11

11HW	Republic
Achorn 33A Hot Work	Achorn
Castdie Alloy	Columbia
Cromo-V	Bethlehem
Dica B Modified	Jessop
Dycast 1	Latrobe
Dynaflex	Latrobe
E 38 Mo	Marathon
Firedie	Columbia
H722-Thermotem 11 (Prehardened)	Heppenstall
H722-Thermoneal 11 (Annealed)	Heppenstall
H & R Hot Work 5	Houghton & Richards
H. W. D. 2	Firth Sterling
Halcomb 218	Crucible

Hotform 2 .... Vanadium-Alloys
NuDie .... Crucible
Potomac A .... Allegheny-Ludlum
Pressurdie 3L .... Braeburn
Pyromet 882 .... Carpenter
Thermold A .... Universal-Cyclops
U S Ultra .... U. N. Alloy Steel
Vasco Jet 1000 .... Vanadium-Alloys
Vulcan-Kidd Magal .... Vulcan-Kidd

H12

10HW .... Republic
12HW .... Republic
345 .... Carpenter
A. S. Cromo WV .... Ackerlind
Achorn 33 Hot Work .... Achorn
Alcodie .... Columbia
CMW .... Milne
Champion HW .... Champion
Chro-Mow .... Crucible
Crodi .... Atlas
Cromo-W .. Bethlehem, Boyd-Wagner
Cromo-WV .... Bethlehem
Cromo-W55 .... Bethlehem
D-C-33 .... Kloster
Dica B .... Jessop
E 38 W .... Marathon
F. C. 5X1 Cast-to-Shape Allegheny-Ludlum
Ferno .... Lehigh
GW 99 Hot Work .... Great Western
H & R Hot Work 6 Houghton & Richards
H & R Hot Work 7 Houghton & Richards
H. P. D. .... Ziv
H. S. C. 33 .... Hoyland
H. W. D. 1 .... Firth Sterling
H. W. S. .... Darwin & Milner
Hotform 1 .... Vanadium-Alloys
Hotform 3 .... Vanadium-Alloys
L. P. D. .... Latrobe
Macco ML .... McDonald
Macco M. L. V. .... McDonald
NonCheck Forge Die .... Coulter
P. H. W. .... Pennsylvania
Penco GR-MO-W .... Peninsular
Potomac .... Allegheny-Ludlum
Pressuride 2 .... Braeburn
T721-Thermotem 12 (Prehardened) Heppenstall
T721-Thermoneal 12 (Annealed) Heppenstall
Thermold B .... Universal-Cyclops
UHB Special .... Uddeholm
U S Ultra 4 .... U. N. Alloy Steel
Volcano .... Lehigh
Vulcan-Kidd TCM .... Vulcan-Kidd
W4X .... Finkl

H13

883 .... Carpenter
A. S. No. 670 Hot Work .... Ackerlind
Achorn 33M Hot Work .... Achorn
CMV .... Milne
Champion HW3 .... Champion
Cromo-High V .... Bethlehem
Crovan .... Atlas
Dica B Vanadium .... Jessop
E 38 V .... Marathon
F. C. 5X1-V Cast-to-Shape Allegheny-Ludlum
GW 99-HV Hot Work .. Great Western
H720-Thermotem 13 (Prehardened) Heppenstall
H720-Thermoneal 13 (Annealed) Heppenstall
H & R Hot Work 5V Houghton & Richards
H. S. C. 33-HV .... Hoyland
H. W. A. .... Darwin & Milner
H. W. D. 3 .... Firth Sterling
Hi-Van .... Peninsular
Hotform V .... Vanadium-Alloys
Maximold .... Ziv
NonErode Die Casting .... Coulter
NuDie V .... Crucible
P. H. Van .... Pennsylvania
Potomac M .... Allegheny-Ludlum
Pressurdie 3 .... Braeburn
Pressurdie 3FM .... Braeburn
Thermold AV .... Universal-Cyclops
UHB Orvar .... Uddeholm
U S Ultra 2 .... U. N. Alloy Steel
V. D. C. .... Latrobe
V-HW .... Republic
Vanadium Castdie .... Columbia
Vanadium Castdie Smoothcut Columbia
Vanadium Firedie .... Columbia
Vanadium Firedie Smoothcut Columbia
Viscount 20 Free Machining .. Latrobe
Viscount 44 Pre-Hardened, Machinable .... Latrobe
Vulcan-Kidd RMK .... Vulcan-Kidd
Vulcan-Kidd Vulcast ... Vulcan-Kidd

H14

CCS .... Crucible
H & R 55 .... Houghton & Richards
K-S .... Universal-Cyclops
Lumdie .... Latrobe
Pressuride 1 .... Braeburn
Red Indian .... Atlas
T 79 .... Heppenstall

H16

K-R .... Universal-Cyclops
W. C. R. .... Firth Sterling

H20

Hotpress .... Vanadium-Alloys

Tungsten Base

H21

2B-LC .... Jessop
57HW .... Bethlehem
3074 Hot Work .... Milne
Achorn 9W Hot Work .... Achorn
Air Hardening No. 30 .... Republic
Atlas A .... Allegheny-Ludlum
B-44-J .... Universal-Cyclops
CLW .... Latrobe
D-C-66 .... Kloster
F. C. 14 .... Allegheny-Ludlum
Formite No. 2 Hot Work ... Columbia
GW 310 Hot Work ... Great Western
H & R Hot Work 2 Houghton & Richards
H. S. C. 310 .... Hoyland
Hodi .... Atlas
L. T. Forging .... Firth Sterling
L. T. L. .... Firth Sterling
Macco P-175 High Speed .. McDonald
Marvel .... Vanadium-Alloys
P. H.-9 .... Pennsylvania
Peerless A .... Crucible
Seneca .... Atlas
Simonds D. N. V. .... Simonds
Special W .... Marathon
T73 .... Heppenstall
T-Alloy A .... Braeburn
T-K .... Carpenter
Vulcan-Kidd 30 Calo Ferro Vulcan-Kidd
Vulcan-Kidd A-42 .... Vulcan-Kidd
WKZ .... U. N. Alloy Steel

H22

2B-MC .... Jessop
Achorn 11W Hot Work .... Achorn
Atlas B .... Allegheny-Ludlum
B-44 .... Universal-Cyclops
H & R Hot Work Houghton & Richards
Peerless LCT 2 .... Crucible
T-Alloy .... Braeburn

H23

B. D. C. .... Firth Sterling
H & R Hot Work 12 Houghton & Richards
H. C. A. .... Braeburn
Halcomb 236 .... Crucible
Kalkos .... Latrobe
Thor .... Universal-Cyclops
WW Hotwork .... Vanadium-Alloys

H24

2B-HC .... Jessop
57 Special Hot Work .... Bethlehem
Achorn 15W Hot Work .... Achorn
Air Hardening No. 40 .... Republic
B-4-B .... Universal-Cyclops
CHW .... Latrobe
Formite No. 3 Hot Work .. Columbia
Macco P-150 High Speed .. McDonald
Mohawk Hot Die .. Allegheny-Ludlum
SC Special .... Vanadium-Alloys
T-Alloy B .... Braeburn
Vulcan-Kidd 50 Calo-Ferro Vulcan-Kidd

H25

B-4-A .... Universal-Cyclops
EHW No. 1 .... Latrobe
Forge-Die .... Vanadium-Alloys
GW 313 Hot Work ... Great Western
H & R Hot Work 15 Houghton & Richards
H. S. C. 313 .... Hoyland
Macco P-125 High Speed .. McDonald
XDL .... Firth Sterling

H26

B-6-X .... Universal-Cyclops
Clarite H W .... Columbia
Clarite J .... Columbia
Clarite L .... Columbia
Electrite 5 .... Latrobe
H & R 50 .... Houghton & Richards
"J" Temper RCS ... Vanadium-Alloys
Rex AA PX Temper .... Crucible
Spartan-5 .... Atlas
Special HS-55 .... Bethlehem
Star-Zenith Low Carbon ... Carpenter
Vinco Hot Work .... Braeburn
Vulcan-Kidd Wolfram Low Carbon .... Vulcan-Kidd
WKD .... U. N. Alloy Steel
XDH .... Firth Sterling
XDM .... Firth Sterling

Molybdenum Base

H41

Mohican-6 .... Alas
MoTung (0.65C) .. Universal-Cyclops

H42

Bedco M-2 High Speed .... Bedford
Electrite 7 .... Latrobe
H & R 45 .... Houghton & Richards
MoTung 652 (0.60C) Universal-Cyclops

Vulcan-Kidd TM-6 Low Carbon	Vulcan-Kidd

H43

HW-8	Bethlehem
Molite HW 10	Columbia
Molite HW 10M	Columbia
MoVan (0.55C)	Universal-Cyclops
NonScuff Hot Work	Coulter

High Speed Molybdenum Base

M1

8-N-2	Vanadium-Alloys
Achorn M1 High Speed	Achorn
Amotun	Atlantic
Electrite Tatmo	Latrobe
H & R Molyhi	Houghton & Richards
HMHS	Bethlehem
Hi-Mo	Firth Sterling
LMW	Allegheny-Ludlum
LMW-EZ	Allegheny-Ludlum
Mo 10	Marathon
Mocut	Braeburn
Mocut (FM)	Braeburn
Mogul	Jessop
Mogul (FM)	Jessop
Mohican-8	Atlas
Molite 1 High Speed	Columbia
MoTung	Universal-Cyclops
Rex TMO	Crucible
Simonds S.T.M.	Simonds
Star Max	Carpenter
Tensiloy Nitriding Die	Allied
Unamo 1	U. N. Alloy Steel
Vulcan-Kidd Vul-Mo	Vulcan-Kidd

M2

66HS	Bethlehem
A. S. No. 66	Ackerlind
Achorn M2 High Speed	Achorn
Bedco M-2 High Speed	Bedford
Braemow	Braeburn
Braemow (FM)	Braeburn
Brilliant MM	Swedish-American
DBL-2	Allegheny-Ludlum
DBL-2-EZ	Allegheny-Ludlum
Delaware H. S.	Delaware
Electrite Double Six M-2 XL	Latrobe
GW 6-6-2	Great Western
H & R 57	Houghton & Richards
H. S. C. 6-6-2	Hoyland
Macco Radio High Speed	McDonald
MM 6 and 6	Milne
Mo 20	Marathon
Molite High Speed	Columbia
Molite Smoothcut	Columbia
MoTung 652	Universal-Cyclops
MT6	Darwin & Milner
Mustang	Jessop
Mustang (FM)	Jessop
Penn-Cut-Moly	Pennsylvania
Record 66	Boyd-Wagner
Red Shadow High Speed	Ziv
Rex M2	Crucible
Simonds Molva T	Simonds
Sixix & Sixix-fm	Atlas
Special M-O High Speed	Republic
Speed Star	Carpenter
Star-Mo-M2	Firth Sterling
T78-Maxicut No. 2	Heppenstall
Twin Mo	H. Boker
Unaspeed-2	U. N. Alloy Steel
Vasco M2	Vanadium-Alloys
Victory	Lehigh
Vulcan-Kidd TM-6	Vulcan-Kidd
Vulcan-Kidd TM-6 FM	Vulcan-Kidd

M3

Achorn M2½-3	Achorn
Atlas M-3	Atlas
Braevan	Braeburn
Braevan FM	Braeburn
Braevan 2	Braeburn
Braevan 2 FM	Braeburn
Darwin M3	Darwin & Milner
DBL-2½	Allegheny-Ludlum
DBL-3	Allegheny-Ludlum
Electrite Corsair XL	Latrobe
Electrite Crusader XL	Latrobe
F. S. M.-2½	Firth Sterling
H & R 7 Types 1 & 2	Houghton & Richards
Jessop M-3	Jessop
MMV	Milne
Mo 30	Marathon
Molite 3 Type 1	Columbia
Molite 3 Type 2	Columbia
Rex M3	Crucible
Twin Mo Va-3	H. Boker
Unavan 3 Type 1	U. N. Alloy Steel
Unicut	Universal-Cyclops
Van Chip	Firth Sterling
Van Cut	Vanadium-Alloys
Vulcan-Kidd Vul-Bro	Vulcan-Kidd

M4

Atlas M4	Atlas
Braefour	Braeburn
Cyclops M4	Universal-Cyclops
Electrite Stark	Latrobe
Neatro	Vanadium-Alloys
Unavan-4	U. N. Alloy Steel

M6

Congo	Braeburn

M7

Electrite Tatmo V	Latrobe
HV-HI-MO	Firth Sterling
LMW-V	Allegheny-Ludlum
Mo 19	Marathon
Motuf	Braeburn
MoTung CV	Universal-Cyclops

M10

Electrite TNW	Latrobe
F.S.M.-10	Firth Sterling
F.S.M.-10 (mod.)	Firth Sterling
H & R Moly Van	Houghton & Richards
Jessop M7	Jessop
Jessop M-10	Jessop
M-10 High Speed	Bethlehem
Motemp	Braeburn
Mo Van	Universal-Cyclops
Rex VM	Crucible
Ten Star	Carpenter
Unavan-10	U. N. Alloy Steel
Van-Lom	Vanadium-Alloys
VLM	Allegheny-Ludlum
VLM-EZ	Allegheny-Ludlum

M15

Electrite Ultravan	Latrobe
Super Unicut	Universal-Cyclops
Vasco Supreme A.	Vanadium-Alloys

M30

8-N-2 Cobalt	Vanadium-Alloys
Como	Braeburn
Como FM	Braeburn
H & R Super Molyhi	Houghton & Richards
Super Hi-Mo	Firth Sterling
Super MoTung	Universal-Cyclops

M33

Electrite Kelvan	Latrobe
Super MoTung Extra	Universal-Cyclops

M34

Atlas M-34	Atlas
Covan	Braeburn
Electrite Tatmo Cobalt	Latrobe
Komo 19/8	Marathon
Super MoTung Special	Universal-Cyclops

M35

Jessop Mustang Special	Jessop
Komo 205	Marathon
Rex M25	Crucible
Super Star-Mo 2-5	Firth Sterling
Unity M-35	U. N. Aloy Steel

M36

Circle "M"	Firth Sterling
Electrite CO-6	Latrobe
H & R Cobalt Moly	Houghton & Richards
MMCO	Milne
Super DBL	Allegheny-Ludlum
Twin Mo-Co	H. Boker

Tungsten Base

T1

AMC	Milne
Achorn T1 High Speed	Achorn
Ark Superior	Armstrong
Atlantic H. S.	Atlantic
B-6	Universal-Cyclops
B-F High Speed	Republic
Blue Chip	Firth Sterling
Blue Streak	Diehl
Brilliant W W	Swedish-American
Cannon	Darwin & Milner
Clarite High Speed	Columbia
Clipper	Kloster
Electrite 1 XL	Latrobe
GW Silver Stripe	Great Western
H & R 1	Houghton & Richards
H. S. C. 18-4-1	Hoyland
High Speed	Faitoute
High Speed Drill Rod, Rounds	Pittsburgh
LXX	Allegheny-Ludlum
Macco Superior High Speed	McDonald
Novo Superior	H. Boker
Penn-Cut	Pennsylvania
Rapid Special	Marathon
Record Superior	Boyd-Wagner
Red Cut Superior	Vanadium-Alloys
Rex AA	Crucible
Simonds Red Streak	Simonds
Spartan-7	Atlas
Special HS	Bethlehem
Star-Zenith	Carpenter
Super High Speed	Ziv
Supremus	Jessop
T75 Maxicut No. 2	Heppenstall
Unalloy T1	U. N. Alloy Steel
Vinco	Braeburn
Vulcan-Kidd Wolfram	Vulcan-Kidd

T2

Achorn T2 High Speed	Achorn
Atlantic V	Atlantic
B-9	Universal-Cyclops
BRM High Speed	Ziv
Cannon Special	Darwin & Milner
E.V.M.	Vanadium-Alloys
Electrite 19	Latrobe
H & R 2	Houghton & Richards
H.V. Blue Chip	Firth Sterling
IXL High Speed	Republic
Lehigh XXX	Lehigh
Meridian HS	Meridian
Milvan	Milne
ML	Allegheny-Ludlum
Novo 2	H. Boker
000 Extra	Marathon

Rex Supervan	Crucible
Simonds Lockport Special	Simonds
Supremus Extra	Jessop
Tensiloy High Speed	Allied
Trojan	Atlas
Twinvan	Braeburn
Unalloy T2	U. N. Alloy Steel
Vanite High Speed	Columbia
Vulcan-Kidd Super	Vulcan-Kidd

T3

Electrite Vanadium	Latrobe
H & R 3	Houghton & Richards
Novo Superior Vanadium	H. Boker

T4

Acmite Colbalt High Speed	Columbia
Atlantic C	Atlantic
B-7	Universal-Cyclops
Cobalt	Braeburn
Cobalt High Speed	Ziv
Darwin 505	Darwin & Milner
Electrite Cobalt	Latrobe
GW Superkut	Great Western
H & R Cobalt	Houghton & Richards
H. S. C. Cobalt 5	Hoyland
Hyco	Milne
Kobalt II	Marathon
Panther Spec.	Allegheny-Ludlum
Purple Label	Jessop
Red Chip	Firth Sterling
Red Cut Cobalt	Vanadium-Alloys
Republic Cobalt High Speed	Republic
Rex AAA	Crucible
Simonds Tunco	Simonds
Unalloy T4	U. N. Alloy Steel
Vulcan-Kidd Wolfram Cobalt	Vulcan-Kidd

T5

Achorn T5 High Speed	Achorn
B-10	Universal-Cyclops
Bonded Carbide Jr	Braeburn
Circle "C"	Firth Sterling
Cobite Cobalt High Speed	Columbia
Darwin 505 Special	Darwin & Milner
Electrite Super Cobalt	Latrobe
H & R 4	Houghton & Richards
Kobalt I	Marathon
Milco 9	Milne
Nipigon	Atlas
Penn-Cut 5	Pennsylvania
Purple Label Extra	Jessop
Red Cut Cobalt B	Vanadium-Alloys
Rex Supercut	Crucible
Simonds Super Cobalt	Simonds
Super Panther	Allegheny-Ludlum
Unalloy T5	U. N. Alloy Steel
Zip High Speed	Ziv

T6

Bonded Carbide	Braeburn
Darwin 1366	Darwin & Milner
Gray Cut Cobalt	Vanadium-Alloys
H & R Super Cobalt	Houghton & Richards
King Cobalt	Jessop
Lehigh S. S.	Lehigh
Macco Enormous	McDonald
Major	Milne
Rex 440	Crucible
Tensiloy Cobalt-Tungsten High Speed	Allied
Unalloy T6	U. N. Alloy Steel

T7

000 Special 31	Marathon
Rex Champion	Crucible
S A200	Marathon
Star Blue Chip	Firth Sterling

T8

B-8	Universal-Cyclops
F. S. 2-5	Firth Sterling
Jessop T-8	Jessop
Maxite Super High Speed	Columbia
Rex 95	Crucible

T9

Carvite High Speed	Columbia
Rex 4V	Crucible

T15

Circle "T"	Firth Sterling
Cyclops T15	Universal-Cyclops
Darwin 5V	Darwin & Milner
H & R 445	Houghton & Richards
SA 900	Marathon
Sabre	Atlas
Vasco Supreme	Vanadium-Alloys

Special Purpose Low Alloy

L1

2K100	Heppenstall
Achorn 100	Achorn
Alloy B	Universal-Cyclops
Presto	Carpenter
Vulcan-Kidd Superior Chrome	Vulcan-Kidd
WKL	Marathon

L2

Albany	Allegheny-Ludlum
Caroga	Allegheny-Ludlum
H & R 15	Houghton & Richards
H & R 85	Houghton & Richards
Halvan	Crucible
Orion	Universal-Cyclops
Tough M	Bethlehem
Vanadium Types	Vanadium-Alloys
Vulcan-Kidd Auto	Vulcan-Kidd
Vulcan-Kidd Hecla	Vulcan-Kidd
Vulcan-Kidd Hecla Special	Vulcan-Kidd

L3

Vanadium BB	Vanadium-Alloys

L5

14MS	Universal-Cyclops

L6

9C68	Heppenstall
Achorn Ni Cro Mo	Achorn
Atlantic Die	Atlantic
Bethalloy	Bethlehem
Champaloy	Crucible
Coldhot	Finkl
Darwin Temper Tough	Darwin & Milner
Econo 2	Champion
H & R N175	Houghton & Richards
Hy-Ten "M" Temper	Wheelock, Lovejoy
N-9	Universal-Cyclops
NC Alloy	Lehigh
Nikro M	Vanadium-Alloys
NonChallenge O.H.	Coulter
R. D. S.	Carpenter
Tioga	Allegheny-Ludlum
Vulcan-Kidd Nicroman	Vulcan-Kidd

L7

14MS	Universal-Cyclops
Atlas KK	Atlas
Framdie	Columbia
Halcomb SS	Crucible
Teton	Allegheny-Ludlum
UA-8	Republic
Viking	Braeburn

Carbon Tungsten

F1

Para	Universal-Cyclops
WS 1 Extra	Marathon

F2

Atlas XXX	Atlas
BFS	Bethlehem
Colonial No. 4	Vanadium-Alloys
Columbia Double Special	Columbia
Fast Finishing	Republic
H & R Gold Label	Houghton & Richards
K-W	Carpenter
Saturn	Universal-Cyclops

F3

Crucible Double Special	Crucible
Rapid Finishing	Jessop

Mold Steels—Low Carbon

P1

A. S. Special Hobbing Iron	Ackerlind
Achorn Rema Iron (Mold Iron)	Achorn
GW Rema Iron	Great Western
H & R Plastic Mold C	Houghton & Richards
Macco Hobomold "C" W.O.H.	McDonald
Mirromold	Carpenter
UH Forma	Uddeholm
Vulcan-Kidd Plastic Die	Vulcan-Kidd
WE Extra	Marathon

P2

A. S. Duramold B	Ackerlind
Achorn Moldaloy (Mold & Die)	Achorn
Duramold B	Bethlehem
Formold	Crucible
Hob-A-Die	Ziv
Penco OCS	Peninsular
Vulcan-Kidd Vulmold	Vulcan-Kidd

P4

Duramold A	Bethlehem
H & R Plastic Mold	Houghton & Richards
Macco Hobomold "A"	McDonald
Penco Air Shock	Peninsular
Super Samson	Carpenter
UMB Premo	Uddeholm
WE 5	Marathon

P5

H & R Plastic Mold B	Houghton & Richards
Macco Hobomold "B"	McDonald
Samson Extra	Carpenter

P6

158 Plastic Mold	Carpenter
Achorn 512 (Cast)	Achorn
Duramold N	Bethlehem
Suprimpacto	Atlas

P20

CSM 2	Crucible
Giant Special	Champion
H & R Multimold	Houghton & Richards
Hy-Ten Mold	Wheelock, Lovejoy
MC-Mold and Cavity	Vanadium-Alloys
Multimold	Bethlehem
R30	Heppenstall
Speed Cut	Vanadium-Alloys

Alphabetical Index of Tool Steel Brands

Brand names of tool steels sold in the United States and Canada, as reported to The IRON AGE by their producers and distributors.

See Section 1 for explanation of symbols in right margins.

2B-LC H21
2B-HC H24
2B-MC H22
Jessop Steel Co.

2K100 L1
Heppenstall Co.

2V72 Cartos W2
Heppenstall Co.

2V90 Cartos W2
Heppenstall Co.

3C40-Super Hardtem (Prehardened)
An oil hardening hot work die steel. Contains C 0.42, Ni-Cr-Mo-V. Heppenstall Co.

3-C Special D5
Jessop Steel Co.

3R40-Moldtem (E.F.M.)
3R40-Holdertem (A.O.H.)
Moldtem for plastic mold dies. Holdertem for die holders. Contains C 0.40, Cr 1.00, Mo 0.20. Heppenstall Co.

5H50-Hardtem
A prehardened steel for die blocks and inserts. Contains C 0.55, Cr-Mo-V. Heppenstall Co.

5M21-Prestem (Prehardened)
5M21-Presneal (Annealed)
A special precipitation hardening alloy, hot work die steel for punches and press dies. Heppenstall Co.

6H55-"C" Anneal
An oil hardening steel for hot work dies. Contains C 0.55, Mn 0.80, Cr 1.10, Mo 0.45, V 0.10. Heppenstall Co.

6H-W
A hot work die steel. Contains C 0.60, Cr 4.00, Mo 0.45, V 0.75. Republic Steel Corp.

8-N-2 M1
8-N-2 Cobalt M30
Vanadium Alloys Steel Co.

9C68 L6
Heppenstall Co.

9R40
An oil hardening Cr-Mo steel for dies and miscellaneous forgings. Contains C 0.40, Mn 0.75, Cr 1.00, Mo 0.45. Heppenstall Co.

10HW H12
Republic Steel Corp.

11 HW H11
Republic Steel Corp.

11 Comet W1 (1.00 C)
11 Special W1 (1.00 C)
11 Special-Vanadium W2 (1.00 C)
The Carpenter Steel Co.

12 HW (mod.) H12
Republic Steel Corp.

14
An alloy steel. Contains C 1.00, Mn 0.35, Si 0.23, Cr 0.45 to 0.50. Kloster Steel Corp.

14A60 (Semdex) W4
14A60 (S-Treated) W4
Heppenstall Co.

14MS L5, L7
27S W5
Universal-Cyclops Steel Corp.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

KEY TO SYMBOLS

C—Carbon
Cr—Chromium
Co—Cobalt
Cu—Copper
Mn—Manganese
Mo—Molybdenum
P—Phosphorous
Si—Silicon
V—Vanadium
W—Tungsten

57HW H21
57 Special Hot Work H24
66HS M2
67 Chisel S1
Bethlehem Steel Co.

67 S4, S5
Universal-Cyclops Steel Corp.

67 Tap O7
Bethlehem Steel Co.

158 Plastic Mold Steel P6
The Carpenter Steel Co.

259 S5
Jessop Steel Co.

288 Brake Die Steel
A chrome-molybdenum (AISI A-4150) alloy steel, heat treated, machine straightened and stress relieved. (248/292 BHN.) Horace T. Potts Co.

345 H12
The Carpenter Steel Co.

404 D2
Republic Steel Corp.
481 S5
484 A2
The Carpenter Steel Co.

550
A chromium base hot work tool steel. Contains C 0.45, Mn 0.65, Cr 1.60, Mo 1.10, V 0.25. Republic Steel Corp.

610 D2
883 H13
The Carpenter Steel Co.

1010-A Moldie
A very soft low carbon steel for hobbing. Contains C 0.08, Mn 0.35, Si 0.15 max. Coulter Steel & Forge Co.

3074 Hot Work H21
A. Milne & Co.

4620-H Moldie
A carburizing nickel molybdenum alloy steel of tool steel quality for cavity molds. Contains C 0.20, Mn 0.65, Ni 1.85, Mo 0.25, Coulter Steel & Forge Co.

A-H5 A2
Bethlehem Steel Co.

A

A70 W1
A110 W1
Heppenstall Co.

A. C. T.
High speed, oil hardening steel, for heavy duty tools. Contains C 0.65, Mn 0.15, Si 0.15, Co 10.00, V 2.00, W 18.00, Mo 0.75. Atlantic Steel Corp.

AL 602
Silico-manganese-moly, water or oil hardening steel, for chisels and various pneumatic tools. Good resistance to shock with moderate hardness. Contains C 0.50, Mn 0.70, Si 1.70, Mo 0.40, V 0.12. Allegheny Ludlum Steel Corp.

AL 609 S5
Allegheny Ludlum Steel Corp.

ALX
A cobalt based, non-ferrous alloy cast-to-shape in the form of turning, boring and facing tools. Also used for extrusion dies. Contains carbon, chromium, tungsten and boron. 59-61 RC as cast. Allegheny Ludlum Steel Corp.

ALX-6
Contains higher cobalt content than does ALX. Used for swaging dies and extrusion dies. 47 RC as cast. Allegheny Ludlum Steel Corp.

AMC T1
AO 20 S1
A. Milne & Co.

A. S. No. 5 A2
A. S. No. 7 S1
A. S. No. 66 M2
Ackerlind Steel Co.

A. S. No. 85 Shock Resisting O. H.
A nickel steel specially alloyed for extra shock resistance in cold and hot work applications. Contains C 0.55, Si 0.30, Mn 0.40, Cr 1.00, Ni 3.00, Mo 0.30. Ackerlind Steel Co.

A. S. No. 121 Improved A4

A. S. No. 670 Hot Work H13
Ackerlind Steel Co.

A. S. Bearcat Shock Resisting
A tough air hardening steel for cold and hot work applications especially punches, dies and rivet-sets. Contains C 0.50, Mn 0.70, Si 0.25, Cr 3.32, Mo 1.35. Ackerlind Steel Co.

A. S. Blue Label W1
Ackerlind Steel Co.

A. S. Brake Die Steel
A prehardened, stress-relieved steel for press brake dies. Contains C 0.51, Mn 0.87, Si 0.08, Cr 0.95, Mo 0.20. Ackerlind Steel Co.

A. S. Cromo WV H12
A. S. Duramold B P2
A. S. Green Label O1
Ackerlind Steel Co.

A. S. Hot Die Steel
A low alloy shock resisting hot work steel, for use with tools or dies operating at temperatures under 1200° F. Contains C 0.45, Si 0.75, Mn 0.25, Cr 1.15, W 2.55, V 0.20. Ackerlind Steel Co.

A. S. Lustre-Die Mold Steel
A prehardened steel readily machinable to a high polish for plastic molds and die-casting die applications. Contains C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25. Ackerlind Steel Co.

A. S. Special Hobbing Iron P1
A. S. Tri-Ack D2
A. S. Vi-Chrome D3
A. S. Vi-Chrome W D6
Ackerlind Steel Co.

A. S. Violet Label
A special oil hardening heavy duty, non-deforming steel for dies, punches and gages. Contains C 0.90, Mn 0.30, Si 0.20, Cr 0.50, W 1.50, V 0.20. Ackerlind Steel Co.

A. S. White Label W2
Ackerlind Steel Co.

A. S. V. **W1 (Gr. 1, 0.80 to 1.20 C)**
Firth Sterling, Inc.

Abrasalloy
A special alloy steel for withstanding friction, wear and abrasion. Contains C 0.35, Mn 0.75, Si 0.95, Ni 1.00, Cr 1.00, Mo 0.25. Atlantic Steel Corp.

Abrasex
A special alloy steel. Bars and plates. Lehigh Steel Corp.

Accurloy
Precision Turned, Ground and Polished to close tolerances. Heat treated alloy with high physical properties. Baldwin Steel Co.

Achorn 9W Hot Work Steel H21
Achorn 11W Hot Work Steel H22
Achorn 15W Hot Work Steel H24
Achorn 33A Hot Work Steel H11
Achorn 33 Hot Work Steel H12
Achorn 33M Hot Work Steel H13
Achorn 100 L1
Achorn 512 Steel (Cast Steels) P6
Achorn Best Carbon W1
Achorn CVM Steel A2
Available in E Z (Sulphurized)
Achorn Carbon Drill Rod W1
Achorn Cold Drawn Tool Steel W1
Achorn Cold Heading Die W1
Achorn Extra Carbon W1
Achorn Extra Chisel W1
Achorn Graphitic Oil O6
Achorn High Production Die D2
Available in E Z (Sulphurized)
Achorn High Production Die 225 D3
Available in E Z (Sulphurized)
Achorn M1 High Speed M1
Available in E Z (Sulphurized)
Achorn M2 High Speed M2
Available in E Z (Sulphurized)
Achorn M2½-3 M3
Achorn Mang Oil O2
Achorn Moldaloy (Mold & Die) P2
Achorn Ni Cro Mo L6
Achorn Oil Hdng Drill Rod O1
Achorn Rema Iron (Mold Iron) P1
Achorn Spring Steel Sheet W1
Achorn Standard Carbon W1
Achorn Superior Oil Hardening O1
Achorn T1 High Speed T1
Available in E Z (Sulphurized)
Achorn T2 High Speed T2
Achorn T5 High Speed T5
Achorn Tool Steel Sheet W1
Achorn U B C Steel S1
Achorn V85 Steel W2
Achorn Steel Co.

Acmite Cobalt High Speed T4
Columbia Tool Steel Co.

Adamas
Brand name of a line of carbides. Adamas Carbide Corp. (See "Carbides" listing in back of this directory.)

Air-4 A4
Bethlehem Steel Co.

Air-Chrom A2
Kloster Steel Corp.

Air Hard A2
Vanadium-Alloys Steel Co.

Air Hardening A2
The DoAll Co.

Air Hardening No. 30 H21
Air Hardening No. 40 H24
Airaloy A4
Republic Steel Corp.

AIRcrat A2
Marshall Steel Co.

Airfree A.H. A4
Jamison Steel Corp.

Airdi 150 D2
Airkool A2
Crucible Steel Co. of America.

Airdi 150-S
Identical with Airdi 150 (D2) with the exception of additional sulfur for easier machinability. Crucible Steel Co. of America.

Airkool S
Identical with Airkool (A2) with the exception of additional sulfur for easier machinability. Crucible Steel Co. of America.

Airkool V
A high C high V-Cr-Mo steel designed to give excellent performance in applications involving extreme abrasive wear: Brick mold liners, sand slinger liners, blanking dies, etc. Air hardening, but may also be hardened by oil quenching. Contains C 2.25, Mn 0.35, Si 0.08, Cr 5.25, V 3.75, Mo 3.00. Crucible Steel Co. of America.

Airloy
Manganese-moly, air hardening die steel. Excellent non-deforming equality. Better toughness and resistance to wear than Manganese oil hardening types. Contains C 1.00, Mn 3.00, Cr 1.00, Mo 1.00. Allegheny Ludlum Steel Corp.

Airloy X Cast-to-Shape A4
Allegheny Ludlum Steel Corp.

Airmo A4
Firth Sterling, Inc.

Airque A2
Airque FM A2
Free machining grade of the above. Braeburn Alloy Steel Corp.

Airque Special
.80 C A2 die steel for heavy blanking and forming applications. Braeburn Alloy Steel Corp.

Airque V
A cold die steel which combines the wear resisting properties of High C —high Cr tool steels with the toughness and non-deforming properties of A2. Contains C 1.25, Mn .50, Si .30 Cr 5.25, Mo 1.15, V 1.00. Braeburn Alloy Steel Corp.

Airque V(FM)
Free machining grade of the above. Braeburn Alloy Steel Corp.

Airtem A2
Lehigh Steel Corp.

Airtreat A. H. A2
Jamison Steel Corp.

Airvan A2
Firth Sterling, Inc.

Albany L2
Allegheny Ludlum Steel Corp.

Albor
A water hardening steel specially alloyed to provide deeper hardness penetration for such applications as coining, cold-striking and cutlery dies. Contains C 0.85, Mn 0.30, Si 0.30, Cr 0.60, Mo 0.20. Ackerlind Steel Co.

Alco M S1
Alco S S1
Universal-Cyclops Steel Corp.

Alcodie H12
Columbia Tool Steel Co.

Alhead
An alloyed cold heading die steel which retains the case-core relationship of straight carbon tool steels but having higher wear resistance. Contains C 1.00, W 1.50, Co 1.50. Allegheny Ludlum Steel Corp.

Alloy B L1
Universal-Cyclops Steel Corp.

Alloy "C" D2
Ackerlind Steel Co.

Alloy 10 S5
Braeburn Alloy Steel Corp.

Alto
A water hardening, shock-resisting, non-tempering tool steel; for chisels, punches, blacksmith tools, rivet sets, crow bars. Furnished in all sizes and shapes. Associated Steel Co.

Altoloy
A shock-proof steel recommended for pneumatic tools. Available in water and oil hardening grades. Associated Steel Co.

Alva Extra W2
Crucible Steel Co. of America.

Amcoh O1
A. Milne & Co.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Amcoloy 70
A low alloy general purpose tool steel for those applications requiring good strength and toughness. A. Milne & Co.

Amotun M1
Atlantic Steel Corp.

Amutit O7
Amutit S O1
U. N. Alloy Steel Corp.

Apex Drill Rods (Polished) W1
Lehigh Steel Corp.

Ark Superior T1
Armaloy
Cast alloy tool bits and cut-off blades with hardness between that of high speed steel and sintered carbide. Armstrong Bros. Tool Co.

Armide
Brand of carbide tool cutters and inserts. Armstrong Bros. Tool Co. (See "Carbides" listing at end of this section.)

Armstrong High Speed
A high speed steel in 3-ft bars in squares, rectangulars and bevels. Armstrong Bros. Tool Co.

Armstrong High Speed Ground
Tungsten-Moly high speed tool bits and cut-off blades. Cobalt high speed tool bits and blades. Armstrong Bros. Tool Co.

Armstrong High Speed Unground
Unground tool bits and cut-off blades. Armstrong Bros. Tool Co.

Arrestite O2
Republic Steel Corp.

Arrow Non-Shrinkable O1
Boyd-Wagner Co.

Astro-1
Modified H-11 for high strength applications such as aircraft and missile structural parts. Firth Sterling Inc.

A. T. 2 D4
Braeburn Alloy Steel Corp.

Atha Pneu S1
Crucible Steel Co. of America

Atlan O1
Atlan HCC D2
Atlantic Steel Corp.

Atlantic 33
A non-tempering, water hardening steel, for cold chisels, punches, blacksmith tools, rivet sets, pneumatic tools, high temperature resisting bars for all hot work, star drills. Contains C 0.33, Mn 0.40, Si 0.65, Cr 0.75, Mo 0.75, Cu 0.75. Atlantic Steel Corp.

Atlantic C T4
Atlantic Die L6
Atlantic H. S. T1
Atlantic Standard W1
Atlantic V T2
Atlantic Steel Corp.

Atlas 93
Chrome-moly, oil hardening shock resisting steel, for leather and fabric cutting dies, wood working tools, etc. Moderate hardness with fair toughness. Contains C 0.55, Mn 0.55, Cr 0.65, Mo 0.35. Allegheny Ludlum Steel Corp.

Atlas A H21
Atlas B H22
Allegheny Ludlum Steel Corp.

Atlas Alpha-8 W1 (0.80 C)
Atlas KK L7

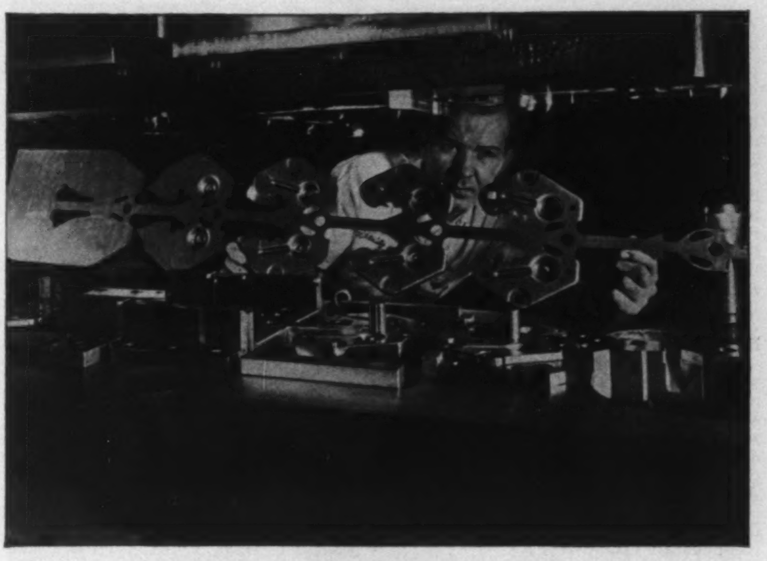
Atlas NN & NN-fm D3
Atlas M-3 M3
Atlas M-4 M4
Atlas M-34 M34
Atlas "Q" W5
Atlas Refined-8 W1 (0.80 C)
Atlas Refined-10 W1 (1.00 C)
Atlas Special Alloy-8 W2 (0.80 C)
Atlas Special Alloy-10 W2 (1.05 C)

Atlas X-10 W1 (1.05 C)
Atlas X-12 W1 (1.20 C)
Atlas XX-95 W1 (0.95 C)
Atlas XXX F2
Atlas Steels, Ltd.

Atloy Z
Special purpose electric furnace steel. Contains C 0.40, Mn 0.90, Si 0.35, Cr 1.10, Mo 0.45, Ni 1.00. Atlantic Steel Corp.

Atmodie D2
Atmodie Smoothcut D2
With free machining additives. Columbia Tool Steel Co.

Atmos
An air hardening, hazard-proof tool and die steel. Ludlow Steel Corp.



7-stage die of Lehigh H forms automotive hinge part

This 7-stage progressive die, of Bethlehem Lehigh H tool steel, formed an automotive die hinge part from 13-gage sheet steel. Hardened to Rockwell C 60, it turned out thousands of pieces economically.

Lehigh H, our air-hardening, high-carbon, high-chrome grade, is deep hardening. It combines excellent machinability with high wear-resistance and minimum distortion in heat-treatment.

In addition to Lehigh H, Bethlehem produces many other tool steels, in a range that meets virtually any requirement. For prompt service, call the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

For more data circle No. 167 on postcard, p. 213

Atsco W1
Atlantic Steel Corp.

Atsco A.R.
An electric furnace steel designed to withstand abrasion and maintain a keen cutting edge against extra hard surfaces. Contains C 0.35, Mn 0.60, Si 0.60, Cr 1.10, Mo 0.20. Atlantic Steel Corp.

Atsco Extra W1
Atsco Special W2
Atsil S5
Atlantic Steel Corp.

Autodie W1 (Gr. 4)
Columbia Tool Steel Co.

B

B-4-A H25
B-4-B H24
B-6 T1
B-6-X H26
B-7 T4
B-8 T8
B-9 T2
B-10 T5
B-44 H22
B-44-J H21
Universal-Cyclops Steel Corp.

B-47
A tungsten, chromium, cobalt hot work steel which has good red hardness, good toughness and good abrasion resistance. Used for brass extrusion dies and dummy blocks, forging die inserts and hot punches. Contains C 0.40, W 4.25, Cr 4.25, V 2.00, Co 4.25. Allegheny Ludlum Steel Corp.

B76 O1
Heppenstall Co.

Badger O1
Latrobe Steel Co.

Baldwin #1
An oil-hardening, non-deforming tool and die steel. Can be heat treated to wide range of hardness with minimum decarburization. Has high shock and wear resistant characteristics. Also available in hollow bars. Baldwin Steel Co.

Baldwin #711
A high shock-resisting tool steel requiring no drawing of temper after hardening; wide range of quenching temperatures. Baldwin Steel Co.

Baldwin A.H.
An air-hardening, non-deforming die steel. Deep hardening properties provide longer useful die life. Baldwin Steel Co.

Beacon W5
Edgcomb Steel Co.

B.D.C. H23
Firth Sterling, Inc.

Bearcat
Air-hardening, shock-resistant tool steel, for punches, rivet sets, cold forming and blanking dies. Contains C 0.50, Si 0.25, Mn 0.70, Cr 3.25, Mo 1.40. Bethlehem Steel Co.

Beaver
A cold work tool steel used for shear blades, slitters, etc. Contains C 0.68, Mn 0.40, Si 1.00, Cr 8.25, Ni 1.00, Mo 1.40 and Va 1.50. Atlas Steels Ltd.

Bedco Alloy S5
Bedco M-2 High Speed M2
Bedco M-2 High Speed H42
Special low carbon analysis. Bedford Tool & Forge Co.

Berkshire
A high carbon, tungsten tap steel. Contains C 1.20, W 1.35. Carpenter Steel Co.

Best Carbon W1
Boyd-Wagner Co.

Best and Superior W2
Bethlehem Steel Co.

Bethalloy L6
Bethlehem Steel Co.

B-F High Speed T1
Republic Steel Corp.

BFS F2
Bethlehem Steel Co.

Black-Diamond W1
Crucible Steel Co. of America.

Blue Chip T1
Firth Sterling Inc.

Blue Label W2
Peninsular Steel Co.

Blue Streak T1
The Diehl Steel Co.

Boker Power Chisel Steel S1
Boko-5—Chrome Die Steel A2
H. Boker & Co., Inc.

Bonded Carbide T6
Bonded Carbide Jr. T5
Braeburn Alloy Steel Corp.

Bora D1
Bora 5 A2
Bora 12 D3
Bora Spezial M D2
Marathon Specialty Steels, Inc.

BR-3
Air-hardening, high carbon, high vanadium die steel for brick mold liners, ceramic tile liners, and other abrasion applications. Latrobe Steel Co.

BR-4 FM D7
Latrobe Steel Co.

Braefour M4
Braemow M2
Braemow (FM) M2
Free machining grade of the above.

Braevan M3
Braevan FM M3
Free machining grade of the above. Braeburn Alloy Steel Corp.

Braevan 2 M3
Braevan 2 FM M3
Free machining grade of the above. Braeburn Alloy Steel Corp.

Brake Die
Special purpose alloy tool steel, pre-heat-treated to 248-293 BHN. Used for press brake dies and other special tooling combining high strength and ease of machinability. Bethlehem Steel Co.

Brilliant M M M2
Brilliant W W T1
Swedish-American Steel Corp.

BRM High Speed Steel T2
Ziv Steel & Wire Co.

Brown Label S1
Peninsular Steel Co.

Brown & Sharpe Plain O1
Oil hardening precision ground flat stock. Brown & Sharpe Mfg. Co.

Brown & Sharpe Ready Mark O1
Precision ground tool steel. Oil hardening grade precolored blue; air hardening precolored maroon. Brown & Sharpe Mfg. Co.

Brown & Sharpe Thrift Stock
Low carbon ground flat stock. Brown & Sharpe Mfg. Co.

BTF Alloy S5
Bedford Tool & Forge Co.

BTR O1
Bethlehem Steel Co.

Bulldog S1
Pennsylvania Steel Corp.

Buster Alloy 50 S1
Buster Alloy 60 S1
Higher carbon content than regular S1 type.
Columbia Tool Steel Co.

BX-3
A wear resistant steel with the following typical analysis: C 2.45, Mn 0.65, Cr 5.00, V 4.50, Mo 1.10, Si 0.75. Jessop Steel Co.

C

C55
An oil hardening steel for hot work dies. Contains C 0.55, Mn 0.50, Cr 0.90, Mo 0.30, Si 0.25, Ni 1.50. Heppenstall Co.

C57-Pyrotem (Prehardened)
C57-Pyroneal (Annealed)
An oil, air hardening steel for hot work dies. Contains C 0.55, Mn 0.60, Cr 1.00, Mo 0.75, Si 0.60, Ni 2.15. Heppenstall Co.

C58-Super Pyrotem (Prehardened)
C58-Super Pyroneal (Annealed)
An oil or air hardening die steel. Contains C 0.55, Ni-Cr-Mo. Heppenstall Co.

CC W5
Republic Steel Corp.

CCS H14
Crucible Steel Co. of America.

C. H. Q. W1 (Gr. 2, 0.90 to 1.05 C)
Firth Sterling Inc.

CHW H24
CLW H21
Latrobe Steel Co.

C M V H13
C M W H12
A. Milne & Co.

CNM
A Ni-Cr-Mo steel for severe service machinery forging applications rang-

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

ing from 25 to 50,000 lb. For high tensile and ductile forgings. A. Finkl & Sons Co.

CNS 1 D2
CNS 1 (FM)
Free machining grade of the above.
CNS 2 D3
CNS 3 D4
Jessop Steel Co.

CSM 2 P20
Crucible Steel Co. of America.

C-V S1
Republic Steel Corp.

Cannon T1
Cannon Special T2
Darwin & Milner, Inc.

Carboloy Cemented Carbides
Brand name of a line of carbides. General Electric Co. (See "Carbides," following this section.)

Carbon W1
Faitoute Iron & Steel Co., Inc.

Carmet
Brand name of a line of carbides. Allegheny Ludlum Steel Corp.

Caroga L2
Allegheny Ludlum Steel Corp.

Carpenter O-1 O1
The Carpenter Steel Co.

Carvite High Speed T9
Columbia Tool Steel Co.

Castdie Alloy H11
Columbia Tool Steel Co.

Cascade
A precipitation hardening die steel for plastic molds, zinc die casting dies and holding blocks. Contains C 0.20, Si 0.30, Mn 0.30, Cr 0.25, Ni 4.10, V 0.20, Al 1.20. Latrobe Steel Co.

Centrex HT
A heat-treated, high-alloy, shaft and gear steel with extremely high tensile strength and abrasion resistance. Ludlow Steel Corp.

Centrex H. T. Hex Nuts
Heat treated, stock sizes available to fit all sizes of Centrex H. T. threaded bar stock. Ludlow Steel Corp.

Centrex H.T. Ring Forgings
All special requirements in forgings quickly furnished in the superior Centrex H.T. quality. Ludlow Steel Corp.

Centrex H. T. Threaded Bar Stock
Precision threading on Centrex H. T. bar stock insures uniformity of thread and close tolerance. Heat treated, high yield and tensile strength. Ludlow Steel Corp.

Centrex PG
Heat-treated, high alloy, specially straightened shafting finished to size, designed to withstand shock and vibration, and endure extreme fatigue. Ludlow Steel Corp.

Centrex Precision Key Stock
Developed specifically to meet the most rigid requirements for "key" applications . . . close tolerance, tight fit, and consistency in section and corners throughout. Ludlow Steel Corp.

Centrex Press Brake Die
A special analysis for brake die operations capable of resisting severe wear and high impact forces. Ludlow Steel Corp.

Centrex Rhino-Tuf
A special heat treated, wear and abrasion-resisting alloy plate, which has from two to ten times the life of mild carbon steel. Ludlow Steel Corp.

Centrex Rhino-Tuf Wearing Strips
The extreme toughness and excellent abrasive-resistant qualities of this steel make it perfect for Wearing Strips. Ludlow Steel Corp.

Champaloy L6
Crucible Steel Co. of America.

Champion 255 S5
Champion Econo #1-V W2
Champion HW H12
Champion HW3 H13
Choyce 77 O1
The Champion Steel Co.

Chimo S5
Firth Sterling, Inc.

Chiz-Alloy S1
Kloster Steel Corp.

Columbia Tool Steels

GRADE LIST	AISI TYPE	Approximate Composition %					Other	See Listing, Page
		C	Cr	W	Mo	V		
HIGH SPEED TOOL STEELS								
Molite	M2	.84	4.15	6.40	5.00	1.85		304
Molite Smoothcut	M2	.84	4.15	6.40	5.00	1.85	*	304
Molite 3 Type 1	M3	1.05	4.00	5.75	5.40	2.40		304
Molite 3 Type 2	M3	1.15	4.00	5.75	5.40	3.15		304
Molite 1	M1	.82	3.75	1.65	8.65	1.10		304
Clarite	T1	.73	4.00	18.00		1.10		294
Vanite	T2	.83	4.25	18.50		2.15		311
Carvite	T9	1.23	4.00	18.50		4.00		293
Acmite	T4	.73	4.00	18.00		1.10	Co 5.00	290
Cobite	T5	.78	4.25	18.50		1.90	Co 8.75	294
Maxite	T8	.81	4.25	14.00		2.15	Co 5.25	303
HOT WORK TOOL STEELS								
Firedie	H11	.38	5.00		1.35	.50		296
Alcodie	H12	.35	5.00	1.25	1.45	.40		290
Vanadium Firedie	H13	.38	5.00		1.35	1.05		311
Vanadium Firedie Smoothcut	H13	.38	5.00		1.35	1.05	*	311
Firedie N Smoothcut	H17	.51	5.00		1.35	1.05	*Ni 1.50	296
Formite # 2	H21	.33	3.25	9.50		.50		297
Formite # 3	H24	.51	3.25	15.50		.50		297
Molite HW10 M	H43	.68	4.00		8.25	1.90		304
DIE TOOL STEELS								
Atmodie	D2	1.55	12.00		.85	.90		291
Atmodie Smoothcut	D2	1.55	12.00		.85	.90	*	291
Superdie	D3	2.10	11.50	.75				309
Super Superdie	D8	2.25	11.50	.80		2.25		309
E-Z-Die Smoothcut	A2	1.00	5.00		1.05	.25	*	296
E-Z-Die V	A7	2.23	5.25	1.15	.95	4.75		296
Exl-Die	O1	.95	.50	.50		.10	Mn 1.25	296
Oildie Smoothcut	O3	1.05	1.60	.50			*	304
SHOCK RESISTING TOOL STEELS								
Buster Alloy	S1	.58	1.25	2.25		.25		292
Silico Alloy	S5	.58	.30		.45		Si 1.95	308
WATER HARDENING TOOL STEELS								
Columbia Special	W1-1	1.03	.16			.04		294
Vanadium Extra	W2-2	1.06				.20		311
Waterdie Extra	W5-2	1.00	.50					313
Columbia Extra	W1-2	1.06						294
Columbia Extra Headerdie	W1-2	.94						294
Waterdie Standard	W5-3	1.00	.50					313
Columbia Standard	W1-3	1.06						294
Columbia Electrex	W1-4	1.06						294

*Contains free machining additives

Columbia Tool Steel Company Main Office & Works Chicago Heights, Ill.

Sales & Service: CHICAGO-MILWAUKEE-DETROIT-CLEVELAND-CINCINNATI-ST. LOUIS-LOS ANGELES

For more data circle No. 168 on postcard, p. 213

Chro-Mow H12
Crucible Steel Co. of America.

Chromdie D2
Faitoute Iron & Steel Co., Inc.

Chromewear A7
Vanadium-Alloys Steel Co.
Circle "C" T5
Circle "M" M36
Circle "T" T15
Firth Sterling, Inc.

Clarite High Speed T1
Columbia Tool Steel Co.

Clarite HW H26 (mod.)
Columbia Tool Steel Co.

Clarite J H26
Columbia Tool Steel Co.

Clarite L H26 (mod.)
Columbia Tool Steel Co.

Clipper T1
Kloster Steel Corp.

Cobalt T4
Braeburn Alloy Steel Corp.

Cobalt Chrome FM D5
Latrobe Steel Co.

Cobalt High Speed Steel T4
Ziv Steel & Wire Co.

Cobite Cobalt High Speed T5
Columbia Tool Steel Co.

Cobra High Speed Tool Bits
A general purpose bit adapted to the severe and varied demands of general machine shop work. Ludlow Steel Corp.

Coldhot L6
A. Finkl & Sons Co.

Colhed W3
Colonial No. 4 F2
Colonial No. 6 O1
Colonial No. 7 W2
Colonial No. 14 W1
Vanadium-Alloys Steel Co.

Colosso
Water hardening steel, for chisels, shear blades, punches, etc. No drawing of temper. Contains C 0.30, Mn 0.65, Si 0.65, Cr 0.30, Ni 0.50, V 0.10, W 0.30, Mo 0.60. Hidalgo Steel Co.

Columbia Autodie W1 (Gr. 4)
Columbia Double Special F2
Columbia Electrex W1 (Gr. 4)
Columbia Extra W1 (Gr. 2)

Columbia Extra Headerdie W1 (0.90 C—Gr.2)
Columbia Special W1 (Gr. 1)
Columbia Standard W1 (Gr. 3)
Columbia Tool Steel Co.

Commando Drill Rod W1
Atlas Steels Ltd.

Como M30
Como FM M30
Free machining grade of the above. Braeburn Alloy Steel Corp.

Congo M6
Braeburn Alloy Steel Corp.

Conqueror W1

Conqueror Hollow W1
Lehigh Steel Corp.

Corinth
A general purpose carbon tool steel, containing C 0.70 to 1.10, Mn 0.30. Allegheny Ludlum Steel Corp.

Covan M34
Braeburn Alloy Steel Corp.

Cromo-V H11
Cromo-High V H13
Cromo-W H12
Cromo-WV H12
Cromo-W55 H12
Bethlehem Steel Co.

Crescent Special W1
Crucible Steel Co. of America.

Crest A.H. A2
Crest O.H. O1
St. Lawrence Steel Corp.

Crocar D4
Vanadium-Alloys Steel Co.

Crodi H12
Atlas Steels, Ltd.

Croma
A special analysis alloy steel of high physical properties for heavy duty machine parts. Lehigh Steel Corp.

Crometex
An industrial steel requiring no heat treatment. Contains C 0.40, Mn 0.70, Si 0.25, Cr 0.80, Mo 0.25. Grayborn Steel Co.

Cromo W H12
Boyd-Wagner Co.

Cromoco D5
Firth Sterling, Inc.

Cromodi
A pre heat treated brake die steel that offers machinability, non-deforming characteristics and high tensile strength. Pyramid Steel Co.

Cro-mo-loy A2
Atlas Steels, Ltd.

Cromovan D2
Firth Sterling, Inc.

Crovan H13
Atlas Steels, Ltd.

Crow
Carbon-chrome, water hardening steel, for drawing dies, forming rolls, etc. Has good shrinkage quality, and hardens deeper than carbon tool steel. Contains C 1.20, Mn 0.25, Cr 0.50. Allegheny Ludlum Steel Corp.

Crucible Double Special F3
Crucible Steel Co. of America.

Crucible Self-Tem
A general purpose high toughness tool and constructional steel. Contains C 0.35, Mn 0.70, Si 0.25, Cr 0.85, W 0.50, Mo 0.40. Crucible Steel Co. of America.

Cuprodie
Ni-Cr-Mo-Cu die block and hot work die steel. Furnished in 5 different hardness ranges from 477-269 Bhn. Furnished heat treated only. A. Finkl & Sons Co.

Cyclops M4 M4
Cyclops T15 T15
Universal-Cyclops Steel Corp.

D

D-C-33 H12
D-C-66 H21
Kloster Steel Corp.

Dargraph O6
Darwin & Milner, Inc.

Darwin 1 D2
Darwin 5V T15
Darwin 505 T4
Darwin 505 Special T5
Darwin 1366 T6
Darwin & Milner, Inc.

Darwin Brake Die Steel
A low-alloy type, special purpose tool steel. Contains chromium and molybdenum. Darwin & Milner, Inc.

Darwin Extra Tough S5
Darwin & Milner, Inc.

Darwin M3 M3
Darwin Special W1 (1.20 C)
Darwin Standard Carbon W1 (0.90 C)
Darwin Temper Tough L6
Darwin & Milner, Inc.

DBL-2 M2
DBL-2-EZ
The free machining form of the above grade.
DBL-2½ M3
DBL-3 M3
Allegheny Ludlum Steel Corp.

DD1
An alloy steel for machine parts and heavy duty applications. Lehigh Steel Corp.

Delair A2
Delaware Extra W1
Delaware H.S. M2
Delaware S.T. S2
Delaware Standard W1
Delaware Tool Steel Corp.

Delaware Superior
High speed steel for pneumatic chisels, heavy duty punches, etc. Delaware Tool Steel Corp.

Delsteel Alloy S5
Delaware Tool Steel Corp.

Densite AH D2
Jamison Steel Corp.

Deward O2
Allegheny Ludlum Steel Corp.

Dexite 14
A tough, oil hardening die steel recommended for punches, dies and shear blades. Available in solid bars, forgings and tubing. North American Steel Co.

Dexite A.H.
A non-deforming, high alloy, air hardening die steel recommended for applications requiring minimum distortion and maximum length of life. North American Steel Co.

Dexite Tubing
Oil hardening tool steel—eliminates boring. North American Steel Co.

Dex-Tung
General purpose tool room steel. North American Steel Co.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Diamond "E" Polished Drill Rod W1
Edgcomb Steel Co.

Dica B H12
Dica B Modified H11
Dica B Vanadium H13
Jessop Steel Co.

DoAll Precision Ground Tool & Die Steels O1 & A2
The DoAll Co.

Double Six D3
Double Seven D5
A. Milne & Co.

Draco Special W2 (Gr. 1)
Draco Standard W2 (Gr. 3)
Universal-Cyclops Steel Corp.

Dukane Drill Rod, Rounds W1 (1.00C)
Pittsburgh Tool Steel Wire Co.

Dumore A2
Ziv Steel & Wire Co.

Dumost 1 W2 (GR 1 0.85C)
Dumost 2 W2 (GR 1 0.95C)
Dumost 3 W2 (GR 1 1.10C)
Dumost 16 W2 (GR 1 1.60C)
Republic Steel Corp.

Duplex W1
Faitoute Iron & Steel Co.

Duramold A P4
Duramold B P2
Duramold N P6
Bethlehem Steel Co.

Durax S1
Swedish-American Steel Corp.

Durax W 2 S1
Marathon Specialty Steels, Inc.

Duredge S5
Boyd-Wagner Co.

Duro
An oil hardening die steel for production dies including blanking, drawing, forming, and laminating. Also for paper knives, reamers, taps, etc. Erie Steel Co.

Durodi
Ni-Cr-Mo-Si die block and hot work die steel furnished in both heat treated and annealed condition. A. Finkl & Sons Co.

Dycast 1 H11
Latrobe Steel Co.

Dycro D2
Pennsylvania Steel Corp.

Dynaflex H11
Latrobe Steel Co.

E

EHW No. 1 H25
Latrobe Steel Co.

E.V.M. T2
Vanadium-Alloys Steel Co.

EB Alloy
General purpose, chrome, hot-work, air or oil hardening steel, for hot header and gripper dies on bolts and rivets, shear blades, trimmer dies, etc. Good resistance to abrasion and heat and less expensive than tungsten, hot work steels. Contains C 0.65, Cr 3.75, V 0.40, Mo 0.50. Allegheny Ludlum Steel Corp.

E 38 Mo H11
E 38 V H13
E 38 W H12
Marathon Specialty Steels, Inc.

EK-81 D5
Universal-Cyclops Steel Corp.

Econo
A special purpose hot work steel used for hot forming dies, hot blanking dies, hot punches and dummy blocks for brass extrusion. Contains C 0.40, Cr 3.75, W 1.00, V 0.75, Mo 5.75. Braeburn Alloy Steel Corp.

Econo 2 L6
Econo 5 A2
The Champion Steel Co.

Elastuf "44"
A special analysis Cr-Ni-Mo electric furnace alloy steel, heat treated, and stress relieved to 42/46 Rc C and machinable. Guaranteed mechanical properties. Horace T. Potts Co.

Elastuf A-2
A special analysis C-Mo-V alloy steel heat treated and stress relieved, approximately 311 BHN. Guaranteed mechanical properties. Uniform hardness throughout cross section. Horace T. Potts Co.

Elastuf Chro-Moly
Heat treated AISI A4142 for bolts

THIS DRILL JIG
NOW MADE IN
25
FEWER
HOURS
12
1
2
3
4
5
6
7
8
9
10
11
TIME

LO-AIR
Low Temperature — Air Hardening*
TOOL and DIE STEEL
Reduces Grinding and Machining Time

LO-AIR, the tool and die steel that features easy machinability and least distortion in hardening, permitted up-grading of steel in this case—as reported by Mr. Joseph Carrera, Plant Superintendent of Quality Tool and Die Company, Hoboken, N.J.—because savings in time more than made up for the difference in material cost.

The drill jig illustrated above required much less heat treating expense—and 25 hours less jig boring and jig grinding time with LO-AIR. It was formerly made of cold rolled machinery steel, which had to be carburized to provide necessary wear resistance. Also, there was a great hazard of cracking in quenching this part. LO-AIR also solved these problems.

For complete data on this and other LO-AIR applications, write for Performance Report No. 23. Also, we will gladly send you a copy of our 12-page LO-AIR brochure which contains full information on this time and money saving tool and die steel. Complete stocks available. Call our nearest warehouse or sales office for quick delivery.

*U.S. Pat. No. 2,355,224

UNIVERSAL CYCLOPS
STEEL CORPORATION
EXECUTIVE OFFICES: BRIDGEVILLE, PA.

UCT-37A

TOOL STEELS • STAINLESS STEELS • HIGH TEMPERATURE METALS

For more data circle No. 169 on postcard, p. 213

and studs. Conforms to ASTM A193 B7. Horace T. Potts Co.

Elastuf PB
A leaded, heat treated, chrome-molybdnum alloy steel, machine straightened, stress relieved-285 min. BHN. Horace T. Potts Co.

Electrite 1 XL T1
Electrite 5 H26
Electrite 7 H42
Electrite 19 T2
Electrite CO-6 M36
Electrite Cobalt T4
Electrite Corsair XL M3
Electrite Crusader XL M3
Electrite Double Six M-2 XL M2
Electrite Dynavan T15
Electrite Kelvan M33
Electrite Stark M4
Electrite Super Cobalt T5
Electrite Tatmo M1
Electrite Tatmo Cobalt M34
Electrite Tatmo V M7
Electrite TNW M10
Latrobe Steel Co.

Electrite MV-1 M50
A high speed steel of low alloy content, suitable for cutting tools where extreme toughness is desired. Latrobe Steel Co.

Electrite MV-2 M52
A high speed steel of intermediate alloy content, for cutting tools requiring toughness and higher abrasion resistance than M50. Latrobe Steel Co.

Electrite Ultravan M15
Electrite Vanadium T3
Latrobe Steel Co.

Elvandi W2
Vanadium Alloys Steel Co.

Emro
A medium carbon, electric furnace steel for forging applications. Offers resistance to strain, vibration, shock and extreme stress. Pyramid Steel Co.

Erco
A high grade, water hardening carbon tool steel for shock resistance. An all-purpose steel designed to resist alternate heating and chilling. Erie Steel Co.

Erie 5
A water hardening alloy tool steel for general purpose work in machine and maintenance shops, including shear blades, punches, blacksmith tools, etc. Erie Steel Co.

Erie AA
A general purpose tungsten high speed steel with high resistance to wear for all types of cutting tools and hot and cold work dies. Erie Steel.

Ex. S W2
U. N. Alloy Steel Corp.

Exl-Die O1
Columbia Tool Steel Co.

Extra W1
Faitoute Iron & Steel Co.

Extra W1 (Gr. 2, 0.80 to 1.20 C)
Firth -Sterling, Inc.

Extra W1
Kloster Steel Corp.

Extra W1 (Gr. 2, 0.80 to 1.20 C)
Republic Steel Corp.

Extra W1
Ziv Steel & Wire Co.

Extra L W1
Vanadium-Alloys Steel Co.

Extra Tough W1
U. N. Alloy Steel Corp.

Extra V W2 (Gr. 2, 1.00 to 1.10 C)
Firth Sterling, Inc.

E-Z-Die Smoothcut A2
With free machining additives. Columbia Tool Steel Co.

E-Z-Die V A7
Columbia Tool Steel Co.

Ez-Tem
An 0.33 C, Cr, Mo, Mn steel; water hardening non-tempering for chisels, bars, picks, rivet sets, etc. St. Lawrence Steel Corp.

F

F. C. 1
An oil hardening cast steel, used for die blocks. Contains C 0.45 to 0.55, Mn 0.50 to 0.60, Si 0.10 to 0.20, Cr. 0.60 to 0.75, Ni 1.50 to 1.75. Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. 5XI-V
Special Cast to Shape. Allegheny-Ludlum Steel Corp.

F. C. 5XI Cast-to-Shape H12
F. C. 5XI-V Cast-to-Shape H13
F. C. 14 H21
Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. 66 D5
F. C. 66 Cast-to-Shape D5
F. C. A. H. Cast-to-Shape D2
Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. AH
A high carbon-high chromium air hardening grade possessing excellent wear resistance and ease of heat treatment. Used for dies, rolls, food crushers, machinery parts, etc., where resistance is of prime importance. Contains C 1.40, Cr 12.00, Mo 0.75, V 0..0, Co 0.75. Forging and Casting Div., Allegheny Ludlum Steel Corp.

F. C. CMS Cast-to-Shape
An oil and air hardening cast steel used for forming machine parts and die casting retainer blocks. Contains C 0.60, Mn 0.70, Cr 1.00, Mo 0.40, V 0.10, Si 0.40, Ni 0.45. Forging and Casting Div., Allegheny Ludlum Steel Corp.

F. C. EZ Cast-to-Shape (O.H.) 06
Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. Fernite 24 Cast-to-Shape
A cast hot-work steel used for special forming and sizing dies. Contains C 2.20 to 2.40, Mn 0.20 to 0.40, Si 0.20 to 0.30, Cr 23.00 to 25.00, W 5.00 to 5.50, V 0.20 to 0.30, Ni 0.20 to 0.30. Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. Flamhard Cast-to-Shape
A flame-hardenable cast steel used for forming. Contains C 0.45 to 0.55, Mn 1.00 to 1.25, Si 0.40 to 0.60, Cr 1.00 to 1.40, V 0.10, Mo 0.35 to 0.45. Forging & Casting Div., Allegheny Ludlum Steel Corp.

F. C. Roloy Cast-to-Shape
A comparable alloy to FC AH with the exception of higher molybdenum which is added to increase even further the depth of hardening. Used primarily for welded tube mill and cold forming rolls. Contains C 1.50, Cr 12.00, Mn 0.40, Si 0.40, Mo 1.20, V 0.50, Co 0.75, Ni 0.25. Forging and Casting Div., Allegheny Ludlum Steel Corp.

F. C. Roloy 2 Cast-to-Shape A2
Allegheny Ludlum Steel Corp., Forging & Casting Div.

FNS & FNS-fm D2
Atlas Steels Ltd.

FPC
A non-tempering chisel steel, for chisels, caulking tools, cold cutters, stone tools, drift pins, etc. Contains C 0.30 to 0.40, Mn 0.60 to 0.80, Cr 0.70 to 0.90, Mo 0.30 to 0.60. A Milne & Co.

FS
Ni-Cr-Mo die block and hot work die steel furnished annealed only. A. Finkl & Sons Co.

F. S. 2-5 T8
F.S.M.-2½ M3
F.S.M.-10 M10
F.S.M.-10 (mod.) M10 (Mod.)
Firth Sterling, Inc.

FX
Ni-Cr-Mo die black and hot work forging die steel furnished in 5 hardness ranges: 477 to 269 Bhn. A. Finkl & Sons Co.

Falcon-4 S1 (.45 C)
Falcon-6 S1 (.55 C)
Atlas Steels Ltd.

Fast Finishing F2
Republic Steel Corp.

Ferno H12
Lehigh Steel Corp.

Firedie H11
Columbia Tool Steel Co.

Firedie N Smoothcut (H17)
A hot work steel containing C 0.51, Si 1.00, Cr 5.00, Mo 1.35, V 1.05, Ni 1.50 and free machining additives for use in severe hot work applications. The unique balance of carbon and nickel in this material results in extremely high resistance to heat checking under normal hot forging conditions. Columbia Tool Steel Co.

Firex Special
Air or oil-hardening steel, for tools resisting shock; also hot work applications such as shears, form dies, etc. Has extreme toughness. Contains C 0.40 to 0.55, Mn 0.40 to 0.90, Si 0.25 ti 0.30, Cr 0.40 to 1.00, Ni 3.75 to 4.00, V 0.15 to 0.20, Mo 0.45 to 0.75. Darwin & Milner, Inc.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Firth VÇ
A tough high speed steel with excellent physical properties for woodworking. Contains C 1.10, Cr 4.00, Mo 3.00, V 4.00. Firth Sterling, Inc.

Firthite
Brand name of a line of carbides. Firth Sterling, Inc. (See "Carbides" following this section.)

Flexite
A free cutting, medium Carbon, Chrome, Moly, Nickel electric furnace alloy steel; heat treated and stress relieved, excellent for highly stressed shafting and machine parts. St. Lawrence Steel Corp.

Flexor
A special machinery steel. Heat treated. Contains C 0.34, Mn 0.74, Si 0.25, Cr 0.87, Mo 0.53, W 0.45. Pennsylvania Steel Corp.

Forge-Die H25
Vanadium-Alloys Steel Co.

Forge-Well
Low Carbon, Chrome, Moly alloy steel for forging and welding applications. Extremely tough material, yet not brittle. St. Lawrence Steel Corp.

Formite No. 2 Hot Work H21
Formite No. 3 Hot Work H24
Columbia Tool Steel Co.

Formold P2
Crucible Steel Co. of America.

Framdie L7
Columbia Tool Steel Co.

Fuego
Used especially for pneumatic chisels, cold punches, shear blades and similar tools. Aloy of Mn, Cr and V with high silicon and low carbon with phosphorus and sulphur at a minimum. Hidalgo Steel Co., Inc.

G

General Purpose
A water-hardening steel designed for good cold chisels and general blacksmith tools where the impact is exceptionally severe. Agawam Tool Co.

Giant Special P20
The Champion Steel Co.

Gibraltar W1 (1.00 C)
H. Boker & Co., Inc.

Grade "A" W2
The Diehl Steel Co.

Granada W1
Granada Vanadium W2
Crucible Steel Co. of America.

Graph-Air
A tough free machining steel that air hardens at relatively low temperature. Available in solid and hollow bars for blanking dies, etc. Contains C 1.35, Mn 1.80, Si 1.20, Mo 1.50, Ni 1.85. Timken Roller Bearing Co., Steel and Tube Div.

Graph-Al
Water hardening steel, for tube drawing mandrels, cold heading dies, and impact applications. Good resistance to abrasion. Excellent machining and impact properties. Contains C 1.50, Mn 0.30, Si 0.20, Al 0.15. Timken Roller Bearing Co., Steel & Tube Div.

Graph-Mo O6
Timken Roller Bearing Co., Steel & Tube Div.

Graph-Tung
Water hardening steel, for bar and tube cold drawing dies, deep drawing dies, bushings, general purpose dies and tools, air hammer pistons. Excellent resistance to abrasion and good impact properties. Contains C 1.50, Mn 0.50, Si 0.65, Mo 0.50, W 2.80. Timken Roller Bearing Co., Steel & Tube Div.

Gray Cut Cobalt T6
Vanadium Alloys Steel Co.

Greek Ascoloy
AMS 5616, 13ptc chromium stainless steel with tungsten and nickel offering improved corrosion and heat resistance properties. Vanadium-Alloys Steel Co.

Green Label
A shock resisting, oil hardening steel for pressure parts, crankshafts. Peninsular Steel Co.

ONE SOURCE FOR ALL TOOLING NEEDS

THE *RIGHT* STEEL OR CARBIDE . . . THE *EXACT* METALLURGICAL COMBINATION TO DO YOUR JOB BEST . . . FROM A SINGLE MANUFACTURING SOURCE

The next time you have a difficult tooling problem we invite you to call in a Firth Sterling man.

He may be called a "tooling specialist" or a "sales engineer" . . . but anyhow he understands the *cutting, shaping* and *forming* of metals like nobody's business. He *may* be an engineer, or may have learned the hard way on a milling cutter, draw bench or press, but he *knows* the score.

You will get an unbiased recommendation from Firth Sterling—producer of almost 100 different high speed steels and tool and die steels *and* 28 grades of tungsten carbide in everything from die nibs to a virtually unlimited variety of standard and special cutting tools and tips.

All this is backed by 71 years of leadership in the development and production of special purpose steels, and 28 years of pioneering in carbide and powder metallurgy applications.

It makes sense, that a company which engages in *all* phases of tooling metallurgy will serve your interests best.

Remember, Firth Sterling *is* a single, dependable source for complete shop tooling.

1-2

Firth Sterling
— INC. —
3113 FORBES ST., PITTSBURGH 30, PA.
offices and warehouses in principal cities.

For more data circle No. 170 on postcard, p. 213

Green Label Drill Rod W1 (1.20 C)
The Carpenter Steel Co.

Grouzabar
A pre-formed alloy steel bar for rebuilding worn grousers on crawler type equipment. Cuts and welds with ease. Pyramid Steel Co.

GSN FM D3
Latrobe Steel Co.

GW 6-6-2 M2
GW 99 Hot Work H12
GW 99-HV Hot Work H13
GW 265-H High Production D3
GW 265 High Production D2
GW 280 Tufkut S5
GW 310 Hot Work H21
GW 313 Hot Work H25
Great Western Steel Co.

GW 350 Fast Finishing
A fast finishing steel. Suitable for turning chilled rolls, brass cutting, cold extrusion dies, etc. Contains C 1.25-1.35, Mn 0.20-0.40, W 3.00-4.00, Si 0.45. Great Western Steel Co.

GW 422 Mirycal S1
Great Western Steel Co.

GW 515 Hot Work
An air-hardening hot-work die steel. Has high degree of toughness and resistance to abrasion. Widely used in the non-ferrous industry. Contains C 0.35, Mn 0.25, Si 1.00, Cr 5.00, W 5.00. Great Western Steel Co.

GW Cold Header W2
GW Extra W1 (1.00 C)
G W "CVM" A2
GW "CW Oil" O1
Great Western Steel Co.

GW L-97
Recommended for use in cold work, drop stamping or cold forging, swaging, shearing, etc. Contains C 0.55, Cr 1.00, Ni 3.00, Mo 0.35. Great Western Steel Co.

GW Regular W1
GW Rema Iron P1
Great Western Steel Co.

GW Rema B
Specially suited for cold hobbed plastic molding dies. Brinell hardness of 100 max. assures ease in hobbing. Hardens in oil and has high core strength. Contains C 0.07, Mn 0.30, Si 0.15, Cr 1.00, Mo 0.25. Great Western Steel Co.

GW Silver Stripe T1
GW Special W1 (1.20 C)
GW Superkut T4
Great Western Steel Co.

H

H-9 Double Header W1 (0.90 C)
Carpenter Steel Co.

H41 (Trimmax)
An oil or air hardening, cold or hot trimmer steel. Contains C 0.95, Mn 0.30, Cr 4.00, Mo 0.25, V 0.20. Heppenstall Co.

H44 A2
H720-Thermotem 13 (Prehardened) H13
H720-Thermoneal 13 (Annealed) H13
H722-Thermotem 11 (Prehardened) H11
H722-Thermoneal 11 (Annealed) H11
Heppenstall Co.

H & R 1 T1
H & R 2 T2
H & R 3 T3
H & R 4 T5
H & R 7 Types 1 & 2 M3
H & R 8 S5
H & R 15 L2
H & R 45 H42
H & R 50 H26
H & R 55 H14
H & R 57 M2
H & R 60 O7
H & R 61 D5
H & R 80 A2
H & R 85 L2
H & R N-175 L-6
H & R 225 S1
H & R 445 T15
H & R 550 H41
Houghton & Richards, Inc.

H & R Brake Die
Furnished heat-treated and low-annealed to Bhn 248/293. Contains C .50,

TOPS in TOOLROOM STEELS
HY-TEN
mold steel
chisel steel
brake die steel
oil-hardening steel
STEEL SERVICE CENTER INSTITUTE
WHEELOCK, LOVEJOY & COMPANY, INC.
"The Alloy Steel Center"

Wheelock, Lovejoy offers a wide range of toolroom steels. These include: Mold Steels, especially suitable for intricate machining operations; Chisel Steel and Brake Die Steel, of tremendous toughness; "M" TEMPER Oil-Hardening Steel, with great penetration of hardness and extreme toughness, with good forging and machining properties.

Your inquiries for complete data are invited. Main office, 130 Sidney Street, Cambridge 39, Mass. Offices and Warehouses also in Cleveland, Chicago, Hillside, N. J., Detroit, Buffalo, Cincinnati. Agents; Sanderson-Newbould, Ltd., Montreal and Toronto, Southern Engineering Co., Charlotte, S. C.

For more data circle No. 171 on postcard, p. 213

For More Data
Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Mn 1.00, Cr .95, Mo .20. Houghton & Richards, Inc.

H & R CM
General purpose air hardening shock steel for both cold and hot work applications such as punches, blanking and forming dies, rivet sets, master hobs, and general purpose tools requiring maximum physical properties and ease of fabrication. Contains C 0.50, Si 0.25, Mn 0.70, Cr 3.25, Mo 1.40. Houghton & Richards, Inc.

H & R Carbon	W1
H & R Cobalt	T4
H & R Cobalt Moly	M36
H & R Gold Label	F2
H & R Heading Die Steel	W1
H & R Hot Work	H22
H & R Hot Work 2	H21
H & R Hot Work 5	H11
H & R Hot Work 5V	H13
H & R Hot Work 6	H12
H & R Hot Work 7	H12
H & R Hot Work 12	H23
H & R Hot Work 15	H25
H & R K	D3
H & R K2	D2
H & R K-2L	D1
H & R K 3	D7 (Mod.)
H & R Moly Van	M10
H & R Molyhi	M1
H & R Multimold	P20
H & R Oil Hardening	O2
H & R Piston	W7
H & R Plastic Mold	P4
H & R Plastic Mold B	P5
H & R Plastic Mold C	P1
H & R Silico	S2
H & R Super Cobalt	T6
H & R Super Molyhi	M30
H & R Tungsten OH	O1
H & R Vanadium	W2 (1.00 to 1.10 C)

Houghton & Richards, Inc.

H Brand	O2

Darwin & Milner, Inc.

H. C. A.	H23

Braeburn Alloy Steel Corp.

HMHS	M1

Bethlehem Steel Co.

H.P.D.	H12

Ziv Steel & Wire Co.

H. S. C. 6-6-2	M2
H. S. C. 18-4-1	T1
H. S. C. 33	H12
H. S. C. 33-HV	H13
H. S. C. 265	D2
H. S. C. 265-H	D3
H. S. C. 280	S5
H. S. C. 310	H21
H. S. C. 313	H25

Hoyland Steel Co.

H. S. C. 350
A fast-finishing steel. Suitable for turning chilled rolls, brass cutting, cold extrusion dies, etc. Contains C 1.30, Mn 0.30, Si 0.45, W 3.50. Hoyland Steel Co.

H. S. C. 422	S1

Hoyland Steel Co.

H. S. C. 515
An air-hardening hot-work die steel. Has high degree of toughness and resistance to abrasion. Widely used in non-ferrous metal industry. Contains C 0.35, Mn 0.25, Si 1.00, Cr 5.00, W 5.00, Mo 0.20. Hoyland Steel Co.

H. S. C. Cobalt 5	T4
H. S. C. Cold Header Die Steel	W1
H. S. C. CVM	A2
H. S. C. CW Oil	O1

Hoyland Steel Co.

H. S. C. L-97
Highly recommended for use in cold work, such as striking dies, drop stamping or cold forging, swaging, shearing, etc. Contains C 0.55, Cr 1.00, Ni 3.00, Mo 0.35. Hoyland Steel Co.

H. S. C. Regular	W1
H. S. C. Special	W1
H. S. C. SS Extra	W1

Hoyland Steel Co.

H. V. Blue Chip	T2

Firth Sterling, Inc.

HV-HI-MO	M7

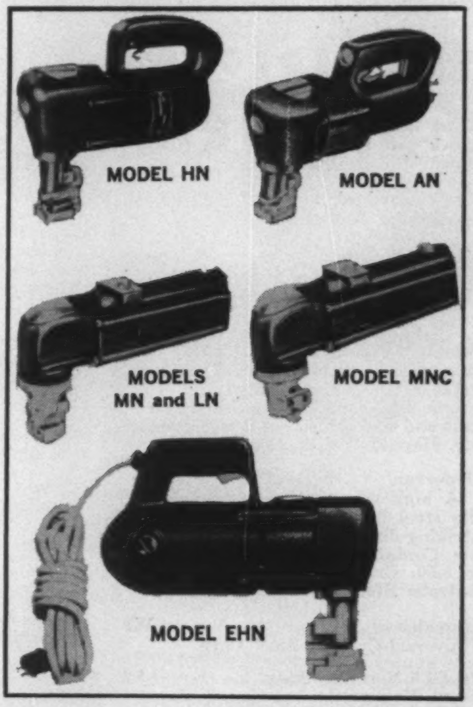
Firth Sterling, Inc.

HW-7
A shock resistant steel for hot forging aircraft special alloys and titanium and cold working. Contains C 0.45, Mn 0.75, Si 1.00 Cr 5.00, W 3.75, Mo 1.00, V 0.50, Co 0.50. Atlas Steels, Ltd.

BOOTH 437—Sept. 6-16—PRODUCTION ENGINEERING SHOW

these, powerful, portable FENWAY NIBBLERS cut more kinds of metal* at lower cost—without distortion

No matter the kind of metal or shape to be cut, FENWAY NIBBLERS (air powered or electric) operate with a cutting action which displaces the metal without distortion on both sides of the sheet: insures finished smooth edge, no chipping, no binding, no curling, no flaking . . . cuts inside circles, squares, odd shaped holes on a per job or production line basis — save time and materials in every application . . . portable, light in weight (8-20 pounds depending on model)—safe, easy to handle, proved durable in critical operations, minimum maintenance, guaranteed unconditionally.



* THE FENWAY NIBBLER CUTS: all non-ferrous metals, copper, brass, aluminum, etc., 10 gauge or 8 gauge stainless steel, tough pitch or asbestos coated corrugated steel, ¼" cold or hot rolled steel and 5/16" aluminum . . . all models guaranteed against defects in materials or workmanship.

FENWAY MACHINE CO., INC.
3107 N. BROAD ST., Phila. 32, Pa.
WRITE TODAY FOR FREE DEMONSTRATION

HW-8 H43
Bethlehem Steel Co.

H.W.A. H13
Darwin & Milner, Inc.

H. W. D. 1 H12
H. W. D. 2 H11
H. W. D. 3 H13
Firth Sterling, Inc.

H. W. D. Mod.
An air hardening, non-deforming die steel with excellent toughness. Contains C 0.55, Si 1.00, W 1.40, Cr 5.25, Mo 1.50, V 0.30. Firth Sterling, Inc.

H. W. S. H12
Darwin & Milner, Inc.

HYCC D4
Halcomb 218 H11
Halcomb 236 H23
Halcomb SS L7
Halgraph O6
Halvan L2
Crucible Steel Co. of America.

Hampden D3
The Carpenter Steel Co.

Hardnair A2
Atlantic Steel Corp.

Hargus
An oil hardening non-deforming steel for punching and blanking dies. Agawam Tool Co.

Hargus O1
Ziv Steel & Wire Co.

Hawk Brand W1 (Gr. 2)
Hawk Cold Header Die W1 (Gr. 2)
Hawkridge Brothers Co.

Hawk Standard W1 (Gr. 3)
Hawkridge Brothers Co.

Haynes Stellite
Trade-mark name given a series of cast alloys of Co, Cr and W, used as a cutting tool material—No. 19, No. 3, Star J-Metal and 98M2. Haynes Stellite 98M2 is used at highest cutting speeds, with longer life between grinds; heavier roughing cuts, with coarse feeds; used for machining steel, cast and malleable iron, brass, bronze, etc. Haynes Stellite Co.

Hedervan
A high vanadium water hardening die steel for cold heading dies, cold striking dies, embossing dies, punches, etc. Contains C 1.40, Si 0.35, Mn 0.40, V 3.50, Cr 0.15 max, Mo 0.10 max. Latrobe Steel Co.

Hercules W7
Universal-Cyclops Steel Corp.

Hi-Di 5 Non Shrinking A2
Boyd-Wagner Co.

Hi-Mo M1
Firth Sterling, Inc.

Hi-Run D2
Kloster Steel Corp.

Hi-Van H13
Peninsular Steel Co.

Hickory No. 7 S1
Jamison Steel Corp.

Hicro 150 D2
Hicro 200 D3
The Diehl Steel Co.

High Production D2
A. Milne & Co.

High Speed T1
Faitoute Iron & Steel Co.

High Speed Drill Rod, Rounds T1
Pittsburgh Tool Steel Wire Co.

Hob-A-Die P2
Ziv Steel & Wire Co.

Hobalite
A water hardening steel, for mold dies, etc. Contains C 0.05, Mn 0.15, Si 0.02, P 0.010, S 0.010. Agawam Tool Co.

Hodi H21 (0.28 C)
Atlas Steels, Ltd.

Hollobar
Oil-hardening forged tool steel tubing containing C 1.00, So 0.30, Cr 1.50, Mo 0.60. Diehl Steel Co.

Hotform 1 H12
Hotform 2 H11
Hotform 3 H12
Hotform V H13
Vanadium-Alloys Steel Co.

Hotpress H20
Vanadium-Alloys Steel Co.

Huron D3
Huron-EZ
The free machining form of the above grade. Allegheny Ludlum Steel Corp.

Hy-Ten "B" No. 3-X
An 0.50 Carbon-Manganese-Chrome-Moly steel furnished especially treated for long wearing brake die applications. Carried in flats and squares and rounds. Excellent machining qualities and ready for use without further treatment. Wheelock, Lovejoy & Co., Inc.

Hy-Ten "M" Temper L6
Hy-Ten Mold Steel P20
Hy-Ten Pneumatic Chisel S5
Wheelock, Lovejoy & Co., Inc.

Hyco D3
Lehigh Steel Corp.

Hyco T4
A. Milne & Co.

Hypro D2
Swedish-American Steel Corp.

Hypro 61 A.H. D2
Hypro 62 O.H. D3
Boyd-Wagner Co.

I

IXL High Speed T2
Republic Steel Corp.

Ideor S1
Darwin & Milner, Inc.

Invaro 1 O1
Firth Sterling, Inc.

J

J-4 S1
Ackerlind Steel Co.

J Hot Working Die
A medium C-Cr hot work steel. Jessop Steel Co.

J. S. Punch S1
Firth Sterling, Inc.

"J" Temper RCS H26
Vanadium-Alloys Steel Co.

J. Y.
A deep hardening wear resisting carbon-chrome tool steel for heavy sections. Carpenter Steel Co.

Jamison Special W1
Jamison Steel Corp.

Jess-Air A6
Jessop Steel Co.

Jessop Chipper Knife
Contains C .48, Mn .35, W 1.29, Mo 1.45, Si 1.10. Jessop Steel Co.

Jessop M-3 (Types #1 & #2) M3
Jessop M-7 M7
Jessop M-10 M10
Jessop T-8 T8
Jessop Mustang Special M35
Jessop Steel Co.

Jet Forge
High chromium hot work die steel containing Cr 7.75, Mo 1.35, V 1.40. Vanadium-Alloys Steel Co.

JJ
A chrome hot work die steel. Jessop Steel Co.

K

K-46 O.H. O1
Jamison Steel Corp.

K-Cobalt
A hot work steel with good red hardness, toughness, and abrasion resistance. Contains C 0.40, Cr 4.25, W 4.25, V 2.00, Co 4.25. Universal-Cyclops Steel Corp.

KHSW S4
KL S1
U. N. Alloy Steel Corp.

K-R H16
K-S H14
Universal-Cyclops Steel Corp.

K-W F2
The Carpenter Steel Co.

Kalkos H23
Latrobe Steel Co.

Kapo D3
Kloster Steel Corp.

Keewatin O1
Atlas Steels, Ltd.

Kennametal
Brand name of a line of carbides. Kennametal, Inc. (See "Carbides" at end of this section.)

Ketos O1
Crucible Steel Co. of America.
Hawkridge Brothers Co. (New England only.)

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

King Cobalt T6
Jessop Steel Co.

Kinite D2
H. Boker & Co., Inc.

Kiski O1
Braeburn Alloy Steel Corp.

Kloster Swed-Oil O1
Kloster Steel Corp.

KLS-44
Cr-Ni-Mo steel for hot and cold work, die blocks, hammer dies and shear blades. Kloster Steel Corp.

Kobalt I T5
Kobalt II T4
Komo 19/8 M34
Komo 205 M35
Marathon Specialty Steels, Inc.

Koncor
A high vanadium, air hardening, hot work die steel for forging and extrusion dies. Contains C 1.10, Si 1.00, Cr 5.25, V 4.00, Mo 1.10. Latrobe Steel Co.

Kromair A2
Republic Steel Corp.

Kromite
A heat treated alloy shaft and gear steel. High tensile strength. Hard, tough, easily machinable. Available in all sizes and shapes. Fast forging service. Associated Steel Co.

Kromite Brake Die
A heat treated brake die steel. Free machining. Work hardening. Available in all sizes and lengths. Associated Steel Co.

Kromite Wear Plate
Abrasive resistant, heat treated plate. Associated Steel Co.

Krovan A2
Diehl Steel Co.

L

L. C. D.
A low-carbon air-hardening steel, for shears, punches, heavy blank and trim dies, coining dies, etc. Special analysis. Pennsylvania Steel Corp.

L. P. D. H12
Latrobe Steel Co.

L. T. A.
Low temperature air hardening steel. Contains C 1.00, Mn 2.00, Cr 0.90, Mo 0.90. Pennsylvania Steel Corp.

L. T. Forging H21
L. T. L. H21 (Mod.)
Firth Sterling, Inc.

LaBelle 2-70 S4
Crucible Steel Co. of America.

LaBelle 89
A hot work steel combining toughness, red hardness and resistance to heat checking. Hardened in air from a relatively low temperature, thus distortion and scaling are at a minimum. Contains C 0.55, Mn 0.30, V 0.90, Cr 3.90, Mo 0.45. Crucible Steel Co. of America.

LaBelle HT
A superior shock resisting steel with good wear properties. Will harden in air in sections up to ¾ in. thick. Heavier sections must be oil quenched. Contains C 0.45, Mn 1.35, Si 2.30, Cr 1.40, V 0.30, Mo 0.40. Crucible Steel Co. of America.

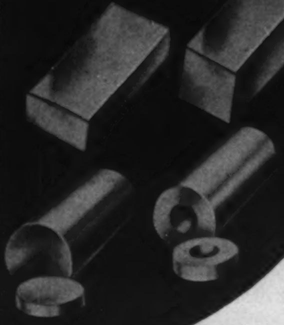
LaBelle Cold Striking W1
Crucible Steel Co. of America.

LaBelle Extra W1
LaBelle Silicon No. 2 S5
Crucible Steel Co. of America.

Leader High Speed Tool Bits
For severe service applications requiring deeper cuts and faster speeds. 20% Tungsten content offers high red-hardness properties. Recommended particularly for machining heat treated steels. St. Lawrence Steel Corp.

Leco Non-Tempering
An electric furnace alloy tool steel that hardens in water and requires no tempering or drawing. Lehigh Steel Corp.

Lehigh H D2
Lehigh L D1



MILNE

For Years A Specialist IN TOOL STEELS

As America's leading tool steel specialist, MILNE is well equipped to service your tool steel needs. Whatever your requirements may be, Milne will help you get full advantage from today's progress in tool steel technology.

Every Milne sales representative is an experienced expert who can call upon the concentrated knowledge and ability of the entire nationwide Milne organization to give you the right steel, in the right place at the right time.

LARGE ENOUGH TO SERVE YOU —SMALL ENOUGH TO WANT TO

Ask your nearest Milne Warehouse for Milne's latest tool steel selector.

A. MILNE & CO., INC.
Established 1887 — Incorporated 1957
General Offices: 67 W. 44th St., N. Y. 36, N. Y.
America's Leading Tool Steel Specialists
Complete Line of Tool Steels — HOLLOW and SOLID

WAREHOUSES:
New York (Kenilworth, N. J.) • Chicago (Melrose Park) • Boston • Philadelphia • Pittsburgh (Carnegie, Pa.) • Cleveland • Dayton San Francisco • Atlanta • Detroit

SALES OFFICES:
New York • Rochester • New Britain, Conn. Indianapolis

AM-60

For more data circle No. 173 on postcard, p. 213

Lehigh S D3
Bethlehem Steel Co.

Lehigh S. S. T6
Lehigh XXX T2
Lehigh Steel Corp.

Lescalloy
A hollow oil hardening alloy tool steel for tools, dies and bushings. Lehigh Steel Corp.

Lestem
A special alloy tool steel that hardens in water without drawing. Lehigh Steel Corp.

Lion W1
Lion Extra W1
Lion Extra-Vanadium W2
Lion Vanadium W2
Jessop Steel Co.

LMW-V M7
LMW M1
LMW-EZ
The free machining form of the above grade. Allegheny Ludlum Steel Corp.

Lo-Air A6
Universal-Cyclops Steel Corp.

Low Carbon Ground Flat Stock
Pittsburgh Tool Steel Wire Co.

Lubri-Die O6
Ziv Steel & Wire Co.

Ludloy
A non-tempering tool steel, tough and shock resistant. Ludlow Steel Corp.

Lumdie H14
Latrobe Steel Co.

Lusco
An oil hardening tool steel for pneumatic tools, designed to withstand severe shock. Ludlow Steel Corp.

Lustre-Die
A pre-heat-treated chrome moly tool steel for plastic molding dies. Has hardness of 293-331 BHN. Bethlehem Steel Co.

Lustre Die
A prehardened steel Brinell 302-352 for plastic molds which machines easily and polishes to a high lustre. Contains C 0.50, Mn 1.00, Si 0.30, Cr 1.10, Mo 0.25. Hoyland Steel Co., Inc.

Lustre-Die Pretreated Moldie Steel
A quenched and tempered free cutting steel for Die Casting dies and Plastic Molds hardened 30/34 RC. Contains C 0.40, Cr 1.15, Mo 0.50 with additives. Coulter Steel & Forge Co.

LXX T1
Allegheny Ludlum Steel Corp.

M

M-10 High Speed M10
Bethlehem Steel Co

M-330
A general purpose hot work steel highly resistant to thermal shock and heat checking. Contains C 0.30, Cr 3.00, Mo 3.00, V 0.60. A. Milne & Co., Inc.

M-331
A higher strength hot work steel for hot extrusion dies for aluminum, magnesium, etc. Contains C 0.40, Mn 0.55, Si 1.00, Cr 3.30, Mo 2.25, V 0.40. A. Milne & Co., Inc.

M-333
A hot work steel with exceptional capacity for dissipating heat. For brass die casting, etc. Contains C 0.30, Cr 3.00, Mo 3.00, V 0.60, Co 2.00. A. Milne & Co., Inc.

MGR
Air hardening punch and die steel which belongs to the medium carbon-medium chromium family of steels. Possesses excellent toughness. Used for many difficult heavy blanking, punching, and shearing operations. Contains C 0.55, Si 0.95, Mn 0.30, W 1.20, Cr 5.00, Mo 1.20. Latrobe Steel Co.

M S M S5
A. Milne & Co.

MX-15
A hot work steel exceptionally though with tremendous capacity to withstand high temperatures and pressures. Precipitation - hardening steel. A. Milne & Co.

M—Tungsten S3
Republic Steel Corp.

Macco 33
Air hardening steel for magnesium and aluminum die casting dies. Contains C 0.40, etc. P. F. McDonald & Co.

Macco 35 A. H. A2
P. F. McDonald & Co.

Macco 99
Oil hardening steel for zinc die casting dies. Contains C 0.35, etc. P. F. McDonald & Co.

Macco B-29 W. H. W2
P. F. McDonald & Co.

Macco Brakedie
Oil hardening brake die steel. Contains C 0.50, etc. P. F. McDonald & Co.

Macco Broaching and Channeller W1
Macco Enormous T6
Macco Extra W1
Macco Foolproof S1
Macco Foolproof O. H. S1
Macco Hard Tuf O. H. S5
Macco Hobomold "A" P4
Macco Hobomold "B" P5
Macco Hobomold "C" W. O. H. P1
Macco Kromax 1 D2
Macco Kromax 2 D5
P. F. McDonald & Co.

Macco Lens Mould
A high speed steel for lens molds. Contains C 0.40, etc. P. F. McDonald & Co.

Macco ML H12
Macco M.L.V. H12
P. F. McDonald & Co.

Macco Non-Temp.
Special purpose steel for shock resisting applications. Contains C 0.35. P. F. McDonald & Co.

Macco P-125 High Speed H25
Macco P-150 High Speed H24
Macco P-175 High Speed H21
Macco Radio High Speed M2
Macco Royal Crown O. H. O1
Macco Sil, Mang. O. H. S4
Macco Solid W1
Macco Special W. H. W1
Macco Standard W1
Macco Superior High Speed T1
P. F. McDonald & Co.

Macco Silver-Die
An oil hardening grade used as a plastic molding steel. Heat treated to Rockwell C 31-36. Contains C 0.52, Mn 1.01, Cr 1.10, Mo 0.25. P. F. McDonald & Co.

Macco W. J. F.
Special purpose high carbon steel for cutting tools. Contains C 1.40. P. F. McDonald & Co.

Magic S5 (mod.)
Jessop Steel Co.

Maintenal
A heat treated, high tensile alloy shaft and gear steel. Excellent machinability and high tensile strength. Pyramid Steel Co.

Major T6
A. Milne & Co.

Man-Cro #1 Wear Plate
Heat treated Chrome, Moly, Manganese alloy plate, excellent for abrasion and impact applications. Welds easily; used for chute liners, hoppers. St. Lawrence Steel Corp.

Mangabraze
Alloy plate, heat treated to approximately 385 Brinell. This high hardness combined with work tested alloys, provides maximum resistance to abrasion, wear, impact and atmospheric corrosion. Baldwin Steel Co.

Manganal
Manganese nickel steel with high impact and abrasion resistance. T.S.: 150,000 psi. Contains C 0.80, Mn 13.00, Si 0.75, Ni 3.00. Stulz-Sickles Co.

Mangano Oil Hardening O2
Latrobe Steel Co.

Mango Plate
A heat treated alloy steel plate offering high physicals and excellent resistance to abrasion and impact. Welds with ease. Pyramid Steel Co.

Maple Leaf W1 (.80 C)
Atlas Steels, Ltd.

Marathon Komo 310 (High Speed Tool Steel)
A Molybdenum/Tungsten grade with additions of Vanadium and Cobalt. This is a first quality grade and excells in hardness and wear resistance. The grade has shown superlative results when used on automatic machines for the mass production of parts. Contains C 1.25, Si 0.30, Mn 0.30, Co 10.5, Cr 4.20, Mo 3.75, V 3.25, W 10.5. Marathon Specialty Steels, Inc.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Marvel H21
Vanadium-Alloys Steel Co.

Maximold H13
Ziv Steel & Wire Co.

Maxite 15 High Speed T15
Maxite Super High Speed T8
Columbia Tool Steel Co.

MCH
Contains C 0.50, Mo 6.25, W 1.00, Cr 3.75, V 0.75, Si 0.50, Mn 0.30. Latrobe Steel Co.

MCL
Contains C 0.30, Mo 6.25, W 1.00, Cr 3.75, V 0.75, Si 0.40, Mn 0.30. Latrobe Steel Co.

MC—Mold and Cavity Steel P20
Vanadium-Alloys Steel Co.

Mercury Special
A special purpose low alloy heat treated tool steel. Contains C 0.33, Mn 0.60, Cr 0.70, Mo 0.25, Si 0.30, W 0.40. St. Lawrence Steel Corp.

Merico
Water-hardening nontempering tool steel recommended for chisels, blacksmith tools, punches, heat-resistant tools and machine parts; fatigue, wear and impact resistance; machinable. Contains C 0.35, Mn 0.40, Si 0.64, Cr 0.77, Co 0.50, Mo 0.76, Cu 0.73. Meridian Steel Co., Inc.

Merico 2
Oil-quench nontempering tool steel excellent for shear blades, rivet sets, dies and pneumatic tools. Contains C 0.40, Mn 0.42, Si 0.62, Cr 0.77, Mo 0.75, Cu 0.75. Meridian Steel Co., Inc.

Meridian A.R. Steels
Heat treated, tough wear resistant steel for stripper plates, shear blades, chutes, liners. Contains C 0.45, Si 0.60, Cr 0.60, Mo 0.20, Zr 0.15, Mn 1.00. Meridian Steel Co., Inc.

Meridian Carbide High Speed Steel
A fine grade W-Co high speed steel highly recommended for cutting tools. Is abrasion and heat resistant. C 0.65, Mn 0.15, Si 0.15, Cr 4.50, W 18.00, V 2.00, Mo 0.75, Co 12.00. Meridian Steel Co., Inc.

Meridian Die "O" Steels O1
Meridian Die Steels A2
Meridian HS Steels T2
Meridian Steel Co., Inc.

Meridian N.C. Alloy Steel
For high wear machine parts, special liner, extreme shock resistance. Contains C 0.30, Ni 3.50, Cr 2.00. Meridian Steel Co., Inc.

Meridian Seamless Alloy Steel Tubing
Oil hardening for dies, bushings. Contains C 1.10, Cr 1.50, Mn 0.45, Mo 0.30, Si 0.35. Meridian Steel Co., Inc.

Mer-Ten Alloy Steel
Free machining, wear resistant, shock resistant, high tensile strength for pins, shafts, cams, all machine parts. Contains C 0.40, Mn 0.85, Si 0.35, Cr 1.00, Ni 1.00, Mo 0.45, Boron treated and leaded. Meridian Steel Co., Inc.

Microloy Ground Flat Stock O1
Capewell Mfg. Co.

Microsteel
Ground and polished shafting steel; close tolerance stock. Free cutting, medium Carbon, Chrome, Moly, Nickel, heat treated alloy steel. St. Lawrence Steel Corp.

Milco 9 T5
Milnair 5 A2
A. Milne & Co.

Milo
Water hardening steel, for hand bull points, chisels, fire tools, flogging tools, shafting, etc. Contains C 0.35 to 0.45, Mn 1.00 to 1.10. Hidalgo Steel Co.

Milo 38
Water hardening steel for pneumatic tools, containing C 0.70 to 0.90. Hidalgo Steel Co.

Miltuff
A carbon, chromium, molybdenum steel with maximum toughness and physical properties together with good red hardness. Contains C 0.50, Cr 3.25, Mo 1.40, Mn 0.70. A. Milne & Co.

Milvan T2
A. Milne & Co.

ONLY SANDVIK Coromant
T-MAX
Adjustable Toolholders
GIVE YOU THESE 3 COST-CUTTING ADVANTAGES

① **LOW INITIAL COST**—for complete toolholder, holds down inventory investment. Triple purpose, solid carbide chipbreaker cuts replacement expense, too.

② **FASTEST, SIMPLEST CHANGING**—Exclusive "Auto-Lift" pin automatically lifts and holds *both* the three-position chipbreaker and clamp *clear of the insert for fumble-free indexing or replacement.* A simple push clicks the chipbreaker into desired position for light, medium or heavy cut.

③ **"NON-BINDING" SHIM PIN**—Shim held by exclusive tempered spring pin. No screw to freeze or bind from machining heat.

Available in a wide range of styles and sizes in positive and negative rake holders to handle almost any machining job. Send for free catalog or contact your nearest Coromant distributor today.

SANDVIK STEEL, INC.
1702 Nevins Road • Fair Lawn, N. J. • Tel. SWarthmore 7-6200
In N. Y. C., ALgonquin 5-2200
CLEVELAND • DETROIT • CHICAGO • LOS ANGELES
SANDVIK CANADIAN LTD.: MONTREAL • TORONTO • VANCOUVER
FROM ORE TO FINISHED PRODUCT WITHIN THE SAME COMPANY
WEST COAST OFFICE & WAREHOUSE: 3338 S. MALT AVENUE
LOS ANGELES 22, CALIF. • RA 3-9116

SANDVIK

SS-207

For more data circle No. 174 on postcard, p. 213

Mineor A2
Darwin & Milner, Inc.

Mirraloy
Turned ground and polished. Heat treated stress relieved, and machine straightened. Associated Steel Co.

Mirromold P1
The Carpenter Steel Co.

ML T2
Allegheny Ludlum Steel Corp.

MM 6 and 6 M2
A. Milne & Co.

MMCO M36
MMV M3
A. Milne & Co.

Mo 10 M1
Mo 19 M7
Mo 20 M2
Mo 30 M3
Marathon Specialty Steels, Inc.

Mo-Chip
High speed steel, for taps, punches and similar tools, containing carbon as required, Cr 5.00, Co 2.50, V 1.00, Mo 8.00. Firth Sterling, Inc.

Mocut M1
Mocut (FM)
Free machining grade of the above. Braeburn Alloy Steel Corp.

Mogul M1
Mogul (FM) M1 (FM)
Free machining grade of the above. Jessop Steel Co.

Mohawk Hot Die H24
Allegheny Ludlum Steel Corp.

Mohican-6 H41
Mohican-8 M1
Atlas Steels, Ltd.

Molex 7
Super quality, oil hardening steel of exceptional toughness in a high degree of hardness; for shear blades and dies. Minimum distortion. Associated Steel Co.

Molex 8
A high nickel, non-deforming, air hardening, tool steel. Recommended for long run die applications. Associated Steel Co.

Molite 1 High Speed M1
Molite 3 Type 1 M3
Molite 3 Type 2 M3
Molite High Speed M2
Molite HW10 H43
Molite HW10M H43
Molite Smoothcut M2
Columbia Tool Steel Co.

Molite H43M H43
Contains added carbon for increased hardenability and wear resistance. Columbia Tool Steel Co.

Monaca Drill Rod, Rounds W1 (1.20 C)
Pittsburgh Tool Steel Wire Co.

Monark-1 S2
Monark-2 S5
Atlas Steels, Ltd.

Mosil S5
Vanadium-Alloys Steel Co.

Motemp M10
Motuf M7
Braeburn Alloy Steel Corp.

MoTung M1
MoTung (0.65C) H41
MoTung 652 M2
MoTung 652 (0.60C) H42
MoTung CV M7
Mo Van M10
MoVan (0.55C) H43
Universal-Cyclops Steel Corp.

MST O2
U. N. Alloy Steel Corp.

MT6 M2
Darwin & Milner, Inc.

Multimold P20
Bethlehem Steel Co.

Mustang (FM) M2 (FM)
Mustang (FM) M2 (FM)
Free machining grade of the above. Jessop Steel Co.

N

N-9 L6
Universal-Cyclops Steel Corp.

N C Alloy L6
Lehigh Steel Corp.

Nasco
A water hardening, shock resisting steel requiring no drawing of temper. Does not easily chip or batter. North American Steel Co.

Nascoloy
A shock-proof steel for pneumatic tools. Available in all sizes and shapes. North American Steel Co.

Neatro M4
Vanadium-Alloys Steel Co.

Neor D3
Darwin & Milner, Inc.

Newmax
Chrome moly plastic mold die steel preheat treated to Brinell 302-352. Ziv Steel & Wire Co.

New Process Cold Header W1
New Process Cold Header Va W2
Jessop Steel Co.

Nichroloy
Special purpose heat treated alloy steel with properties of high tensile strength and resistance to fatigue, shock, torque and wear. Baldwin Steel Co.

Nikro M L6
Vanadium-Alloys Steel Co.

Nipigon T5
Atlas Steels, Ltd.

Nitro W2 (1.00 C)
The Carpenter Steel Co.

Nitung
A special purpose hot work steel. Contains C 0.30, Cr 2.75, Mo 0.30, W 9.50, Ni 1.60. Pennsylvania Steel Corp.

Non-Pa-Reil O1
Swedish-American Steel Corp.

Non-Tempering
A general purpose low-carbon, low-alloy tool steel. Can be hardened over a wide range of temperatures without tempering. Bethlehem Steel Co.

NonAbrade A. H. D2
NonAbrade Cobalt D5
NonAbrade O. H. D3
NonAnnealed Standard Carbon W1 (0.80 C)
NonChallenge O. H. L6
NonChange A. H. A2
NonCheck Forge Die H12
NonDistort O. H. O1
NonErode Die Casting H13
NonExcelled Extra Carbon W1 (1.00 C)
NonScuff Hot Work H43
NonShock Tungsten S1
NonSpall Punch and Chisel S5
Coulter Steel & Forge Co.

NonTemper
A general purpose tool steel with shock resistant properties. Contains C 0.35, Mn 0.70, Si 0.45, Cr 0.80, Mo 0.30, Cu 0.30. Coulter Steel & Forge Co.

Novo 2 T2
Novo Superior T1
Novo Superior Vanadium T3
H. Boker & Co., Inc.

Nu-Pyr-Loy
A high alloy steel for pneumatic and shock tool applications. Pyramid Steel Co.

NuDie H11
NuDie V H13
Crucible Steel Co. of America.

Nutherm A6
Atlas Steels Ltd.

O

Ohio Die D2
Vanadium-Alloys Steel Co.

OHT O1
Darwin & Milner, Inc.

Oil Hardening Tubing
Non-shrink tool steel tubing for dies, rolls, collets, knives, etc. Contains C 1.00, Mn 1.00 max., Cr 1.50, Mo 0.20 max. Bissett Steel Co.

OILcrat O1
Marshall Steel Co.

Oildie Smoothcut (O3)
An oil hardening non-deforming chromium tungsten die steel. Contains C 1.05, Mn 0.80, Cr 1.60, W 0.50. Deep hardening with high strength for heavy blanking, piercing, shaving, trimming and forming dies and die sinking hubs. With Free Machining Additives. Columbia Tool Steel Co.

Oilgraph O6
Allegheny Ludlum Steel Corp.

Oilhard O1
Faitoute Iron & Steel Co., Inc.

Oil Hardening O1
The DoAll Co.

Oilway O1
H. Boker & Co.

Olympic D2
Olympic FM D2
Latrobe Steel Co.

Omega S5
Bethlehem Steel Co.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Faitoute Iron & Steel Co.

Ontario D2
Ontario-EZ
The free machining form of the above grade. Allegheny Ludlum Steel Corp.

OOO Extra T2
OOO Spezial 31 T7
Marathon Specialty Steels, Inc.

Orange Label W1 (1.05 C)
A. Milne & Co.

Orbit A6
Crucible Steel Co. of America.

Orion L2
Universal-Cyclops Steel Corp.

Ottawa 60
A high carbon — high vanadium steel with the ultimate in wear resistance. Designed for cold forming operations. Particularly abrasion resistance is of prime importance such as deep drawing, oil or air hardening. Contains C 3.25, Cr 1.00, Mo 1.00, V 12.00. Allegheny Ludlum Steel Corp.

P

P-B Drill Rod W1
Patriarche & Bell, Inc.

P.H.-9 H21
Pennsylvania Steel Corp.

P.H.-14
A special purpose hot work steel. Contains C 0.42, Cr 3.50, V 0.30, W 14.00. Pennsylvania Steel Corp.

P.H. Van H13
P.H.W. H12
Pennsylvania Steel Corp.

Panther 5
A high vanadium tungsten cobalt high speed steel which has very high hardness, high abrasion resistance and good toughness. Intended for high production runs and extra duty cutting. Contains C 1.50, W 12.50, Cr 4.75, V 5.00, Co 5.00. Allegheny Ludlum Steel Corp.

Panther Spec. T4
Allegheny Ludlum Steel Corp.

Par-Exc S1
Vanadium-Alloys Steel Co.

Para O7, F1
Universal-Cyclops Steel Corp.

Peerless A H21
Peerless LCT 2 H22
Crucible Steel Co. of America.

Peerless 56
A hot work steel with greater resistance to softening than the higher alloy types such as H12 and H21. Contains C 0.40, Mn 0.55, Si 1.00, Cr 3.25, V 0.33, Mo 2.50. Crucible Steel Co. of America.

Peerless 750
A hot work steel with a high order of abrasion resistance. Used for cold working applications requiring high toughness. Especially recommended for shear blades and clipper knives. Contains C 0.45, Mn 0.25, Si 0.95, Cr 7.50, W 1.00, Mo 1.00. Crucible Steel Co. of America.

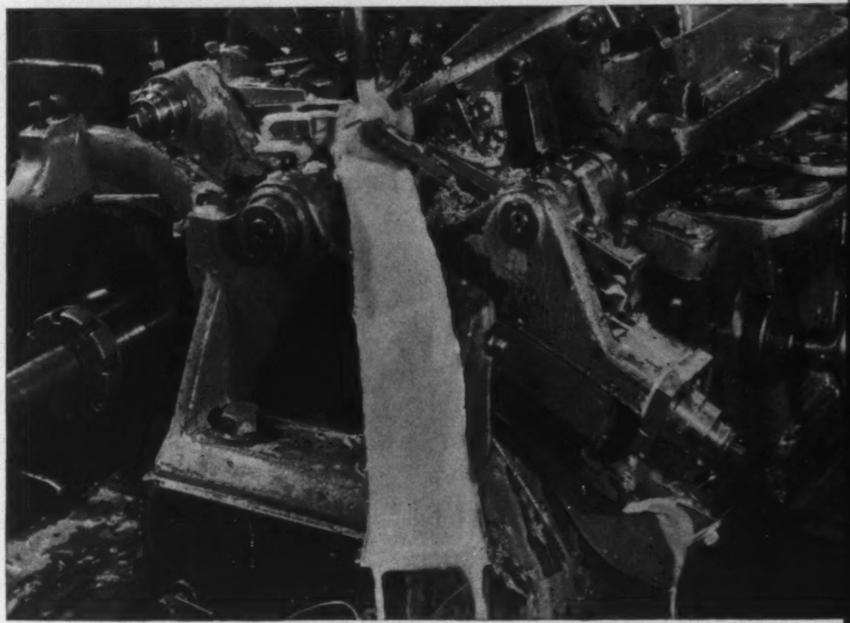
Penair 5 A2
Penco Air Shock P4
Penco BD-30
Prehardened medium carbon, low alloy, general purpose steel. Flats pre-hardened to 241-269 BHN, Rounds to 302-350 BHN. Peninsular Steel Co.

Penco CR-MO-W H12
Penco OCS P2
Peninsular Steel Co.

Penco Non-Tempering
A general purpose tool steel used for chisels, punches, dies, shear blades and similar tools for repeated impact at normal temperatures. Quench in oil or water requires no temper. Contains C 0.35, Mn 0.70, Cr 0.80, Si 0.45, Mo 0.30, Cu 0.30. Peninsular Steel Co.

Penn-Air A2
Penn-Cut T1
Penn-Cut 5 T5
Penn-Cut-Moly M2
Pennsylvania Steel Corp.

Penn-Flex
A low alloy steel, heat treated. Contains C 0.35, Mn 0.70, Si 0.30, Cr 0.90,



If the job calls for an emulsifying cutting oil, you can get better results with

GULFCUT® HEAVY DUTY SOLUBLE OIL

Here's a true heavy duty soluble cutting oil—the kind you can use successfully on tough cutting and grinding operations.

Gulfcut Heavy Duty Soluble Oil won't separate or gum in wheels, slides, ways, or other machine parts. It provides greater rust protection and has excellent emulsion stability—even in hardest water. It also has high surface-wetting properties that provide more effective cooling. And lastly, it contains a highly effective germicide that helps eliminate rancidity.

Improve your production and cut machining costs with Gulfcut Heavy Duty Soluble Oil. Just call a Gulf Sales Engineer at your nearest Gulf office. Meanwhile, use the coupon below and send for your free copy of illustrated pamphlet.

GULF MAKES THINGS RUN BETTER!

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Building, Houston 1, Texas
Please send me illustrated pamphlet on Gulfcut Heavy Duty Soluble Oil.

Name________________
Title________________
Company________________
Address________________
City________Zone________State________

For more data circle No. 175 on postcard, p. 213

Mo 0.45, W 0.40. Pennsylvania Steel Corp.

Piston W7
Bethlehem Steel Co.

Pittsburgh Air Hardening Ground Flat Stock A2
Pittsburgh Tool Steel Wire Co.

Plancher
An oil hardening steel, for shear blades, punches, etc. Is shock resisting. Agawam Tool Co.

Plancher S5
Ziv Steel & Wire Co.

Pompton W1 (0.80 to 1.20 C)
Potomac H12
Potomac A H11
Potomac M H13
Allegheny Ludlum Steel Corp.

Pressurdie 1 H14
Pressurdie 2 H12
Pressurdie 3 H13
Pressurdie 3 FM H13
Free machining grade of the above.
Pressurdie 3L H11
Braeburn Alloy Steel Corp.

Pressurdie 5
An intermediate hot work steel which has very high resistance to softening on exposure to elevated temperatures and good wear resistance. Uses include extrusion dies and mandrels, forging dies, tube piercer points and hot punches. Contains C 0.38, Mn 0.60, Si 1.00, Cr 3.50, V 1.00, W 1.25, Mo 1.00. Braeburn Alloy Steel Corp.

Pressurdie 16
A highly wear resistant die steel for slightly elevated temperature applications such as trimmer dies, forming rolls and dies and forging die inserts. Contains C 0.55, Mn 0.35, Si 0.90, Cr 5.00, V 0.20, W 1.25, Mo 1.25. Braeburn Alloy Steel Corp.

Pressurdie C
A hot work die steel highly resistant to softening and abrasion, particularly suited for dummy blocks for brass tube extrusion, valve extrusion die inserts and forging die inserts. Contains C 0.38, Cr 4.20, W 4.20, Mo 0.50, V 2.20, Co 4.20. Braeburn Alloy Steel Corp.

Presto L1
Carpenter Steel Co.

PRK-33 D5
Darwin & Milner, Inc.

Progen
A very hard and tough steel which hardens in water with no tempering. For shock tools, chisels, pneumatic tools, punches, shear blades, and blacksmiths' tools. Seaboard Steel Co. of America, Inc.

Pure-Ore
See Hi-Run, Kapo, Super Alloy, Air-Chrom, Chiz-Alloy, D-D-33, D-C-66, No. 14, Clippers, Special, Extra, Standard, K-L-S-44, V-76. Kloster Steel Corp.

Purple Label T4
Purple Label Extra T5
Jessop Steel Co.

Pyr-Air-Die
Air hardening tool steel offering minimum deformation in heat treatment. Adapted to a wide range of uses including dies, punches and blanking tools. Pyramid Steel Co.

Pyr-Oil-Die
An oil hardening, non-deforming die steel spherodized annealed to 20 RC. Available in bars, forgings and tubing. Pyramid Steel Co.

Pyromet 882 H11
Carpenter Steel Co.

Python W2 (0.90 to 1.00 C)
Allegheny Ludlum Steel Corp.

Q

Quality Carbon Drill Rod W1
Latrobe Steel Co.

R

R30 P20
R43-Kleenkut D2
R45 D1
R97-Hevi-Duty S5
Heppenstall Co.

R718-Thermotem 10 (Prehardened)
R718-Thermoneal 10 (Annealed)
An air hardening steel for dies and inserts, shear blades, etc. Contains C 0.35, Mn 0.30, Si 1.00, Cr 5.00, Mo 1.80. Heppenstall Co.

R. D. S. L6
The Carpenter Steel Co.

Rapid Finishing F3
Jessop Steel Corp.

Rapid Special T1
Marathon Specialty Steels, Inc.

Record 66 M2
Record Superior T1
Boyd-Wagner Co.

Red Chip T4
Firth Sterling Inc.

Red Cut Cobalt T4
Red Cut Cobalt B T5
Red Cut Superior T1
Vanadium-Alloys Steel Co.

Red Indian H14
Atlas Steels Ltd.

Red Label W1 (1.00 C)
A. Milne & Co.

Red Shadow High Speed Steel M2
Ziv Steel & Wire Co.

Red Star Tool W1
Red Star Tungsten O7
Red Star Vanadium W2
Vanadium-Alloys Steel Co.

Regular W1
Ziv Steel & Wire Co.

Reliance W1 (1.00 C)
Drill rod, flat and square. Pittsburgh Tool Steel Wire Co.

Rema
A dead-soft very low-carbon steel which hobs easily. Suitable for making deep cavity molds for plastics industry. Contains C 0.05, Mn 0.20, Si 0.10. Hoyland Steel Co.

Rema B
Specially suited for cold hobbed plastic molding dies. Brinell hardness of 100 max. Hardens in oil, and has high core strength. Contains C 0.06, Mn 0.30, Si 0.15, Cr 1.00, Mo 0.25. Hoyland Steel Co.

Republic Cobalt High Speed T4
Republic Steel Corp.

Resco
A tungsten-nickel type of hot work steel for severe hot operations. Contains C 0.25 to 0.30, Mn 0.30 to 0.40, W 9.50 to 10.50, Cr 2.50 to 3.00, Mo 0.20 to 0.30, Ni 1.50 to 1.75. Republic Steel Corp.

Rex 3V
A tungsten type high speed steel with wear resisting properties superior to T1 but greater toughness than T9. Contains C 1.00, Mn 0.30, Si 0.30, Cr 4.00, V 3.00, W 14.00, Mo 0.75. Crucible Steel Co. of America.

Rex 4V T9
Rex 95 T8
Rex 440 T6
Rex AA T1
Rex AAA T4
Rex AA PX Temper H26
Crucible Steel Co. of America.

Rex AA OX Temper
A tungsten type high speed similar to Ti but with greater toughness and slightly less wear resisting. Generally used at Rockwell C 55/63. Contains C 0.65, Mn 0.30, Si 0.30, Cr 4.00, V 1.10, W 18.00. Crucible Steel Co. of America.

Rex Champion T7
Rex M2 M2
Crucible Steel Co. of America.

Rex M2S
Identical with Rex M-2 (M2) with the exception of additional sulfur for easier machinability. Crucible Steel Co. of America.

Rex M25 M35
Crucible Steel Co. of America.

Rex M3 M3
Rex Supercut T5
Rex Supervan T2
Rex TMO M1
Rex VM M10
Crucible Steel Co. of America.

Rocket S5
Lehigh Steel Corp.

RTS S2
Jessop Steel Co.

Ry-Alloy O2
Joseph T. Ryerson & Son, Inc.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

S

S 325 D2
S 362 S5
U. N. Alloy Steel Corp.

SA 200 T7
SA 900 T15
Marathon Specialty Steels, Inc.

SC Special H24
Vanadium-Alloys Steel Co.

S. O. D. O2
Braeburn Alloy Steel Corp.

Sebara
An abrasion resistant and friction resistant alloy steel plate which wear-hardens and actually develops better abrasion resistant qualities with use. Seaboard Steel Co. of America, Inc.

Sabre T15
Atlas Steels Ltd.

Sagamore A2
Allegheny Ludlum Steel Corp.

Sagamore EZ A2
The free-machining form of the above grade.

Sagamore V
A high carbon-high vanadium development from the Sagamore analysis. Especially for very abrasive applications. Contains C 2.40, Cr 5.25, Mo 1.10, V 4.25. Allegheny Ludlum Steel Corp.

Samson Extra P5
Carpenter Steel Co.

Sanderson Extra W1
Sanderson Special W4
Crucible Steel Co. of America.

Saratoga O1
Allegheny Ludlum Steel Corp.

Saturn F2
Universal-Cyclops Steel Corp.

Seaboard Special
An unusual high tensile strength steel for use on certain shafts where torsional strains and stresses are prevalent. Seaboard Steel Co. of America.

Secobalt
A super high speed steel for roughing and deep interrupted cuts. High Co content. Contains C 0.75, Mn 0.30, Cr 5.00, Co 11.00, V 1.50, W 18.00, Mo 0.80. Seaboard Steel Co. of America.

Secoleo
A tough and long wearing oil hardening die steel, relatively low in carbon content but rich in alloys. Manufactured in the most modern Electric Furnaces by specialists and of most carefully selected raw materials. Seaboard Steel Co. of America.

Secovan
A high speed steel for roughing and finishing. High V content. Contains C 0.70, Mn 0.25, Cr 4.50, V 2.25, W 18.00, Mo 0.65. Seaboard Steel Co. of America.

Select B FM A2
Latrobe Steel Co.

Seminole S1
Seminole Hard S1
Seminole Medium S1
Allegheny Ludlum Steel Corp.

Seneca H21 (.35 C)
Atlas Steels, Ltd.

Shearcut S5
Pennsylvania Steel Corp.

Sheffield 10
A heat treated alloy shaft and gear steel easily machinable. High tensile strength. North American Steel Co.

Sheffield 20
A heat treated alloy steel. Turned ground, and polished. Close tolerances guaranteed. North American Steel Co.

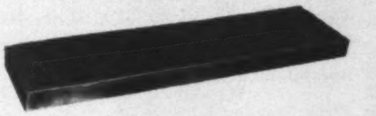
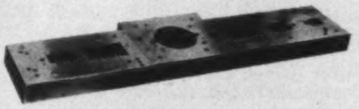
Sheffield P. B.
A completely stress relieved, heat treated alloy press brake die steel. Free machining. Minimum warping. North American Steel Co.

Sheffield Plate
Heat treated, abrasive, shock-resisting plate. North American Steel Co.

Sheffield Threaded Steel
Continuously threaded heat treated alloy bars. North American Steel Co.

How to Know **BEFORE DELIVERY**

What Results You'll Get from the TOOL AND DIE STEELS You Order

NO. 610 (Air Wear)
NO. 484 (Air Hard)
VEGA (Air Tough)
HAMPDEN (Oil Wear)
STENTOR (Oil Hard)
R.D.S. (Oil Tough)
K-W (Water Wear)
NO. 11 SPECIAL (Water Hard)
SOLAR (Water Tough)
SPEED STAR (Red Wear)
T-K (Red Hard)
NO. 883 (Red Tough)

Maximum performance from your tools and dies is possible *only* when your design, toolmaking and heat treating are backed by sound, top quality tool and die steels. You control the first *three factors*. But how can you be sure, *before delivery*, that the die steels you order will deliver the *results* you want? To give you this assurance, Carpenter puts its "mark" on *every* grade of die steel it produces. This mark, or brand name, is the sign of *consistent Carpenter quality*.

In back of it, at Carpenter, is a long list of painstaking controls. These include Hot Acid Etch Inspection, Ultrasonic Testing, Tough Timbre and Hardenability Testing. And that's only the start of many *extras* you get with Carpenter brands of tool and die steels . . . extras that enable you to predict *in advance* results you'll get on the job!

All this . . . and more, stands behind every bar of Carpenter Matched Tool and Die Steel. So, when you see any of these Carpenter brand names, you can feel *safe* in the knowledge you're getting *full value* from your investment. Specify Carpenter Matched Tool and Die Steels. It costs you no more to be *sure!*

And each bar is colored *full length* with a distinctive color for each grade. Here's *positive* identification!

No. 610
HAMPDEN
K-W
SPEED STAR
No. 484
STENTOR
11-SPECIAL
T-K
VEGA
R.D.S.
SOLAR
No. 883

Tool Steel

Carpenter **steel**

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

For more data circle No. 176 on postcard, p. 213

Shelldie
A 5.00 Cr—2.00 Mo hot work die steel furnished in both the annealed and heat treated condition. A. Finkl & Sons Co.

Shellex
Cr-Mo-Si-V hot work die steel furnished in both the annealed and heat treated condition. A. Finkl & Sons Co.

Shock-Rite S5
St. Lawrence Steel Corp.

Silico Alloy S5
Columbia Tool Steel Co

Silman S4
Vanadium-Alloys Steel Co.

Silvaloy
Turned, ground, polished, heat treated, stress relieved and machine straightened. For shafting or machined parts. Pyramid Steel Co.

Silvan Star W2
Firth Sterling Inc.

Silver Label S5
Peninsular Steel Co.

Silver Star W4
Firth Sterling Inc.

Simoch
Silicon-molybdenum-chromium steel offering high impact strength for shock resisting tools. Vanadium-Alloys Steel Co.

Simonds 864 02
Simonds 12225 D3
Simonds Airtrue 51 A2
Simonds Blue Label Extra W1-W2 (Gr. 2)
Simonds C. C. M. D2
Simonds Commando 47 S1
Simonds D.N.V. H21
Simonds Diamond "S" Standard W1-W2 (Gr. 3)
Simonds Green Label W1-W2 (Gr. 4)
Simonds Havoc S2
Simonds Lockport Special T2
Simonds Molva T M2
Simonds Orleans S5
Simonds Red Label Special W1-W2 (Gr. 1)
Simonds Red Streak T1
Simonds Red Streak Flat A2
Ground die steel.
Simonds Red Streak Flat O1
Ground die steel.
Simonds S.T.M. M1
Simonds Super Cobalt T5
Simonds Teenax 46 O1
Simonds Tunco T4
Simonds Saw & Steel Co.

Sixix & Sixix-fm M2
Atlas Steels Ltd.

Solar S2
The Carpenter Steel Co.

Sparta A2
Sparta CV A7
Universal-Cyclops Steel Corp.

Spartan-5 H26
Spartan-7 T1
Atlas Steels, Ltd.

Special W1
Braeburn Alloy Steel Corp.

Special W1
Faitoute Iron & Steel Co.

Special W1 (Gr. 1, 0.80 to 1.20 C)
Firth Sterling Inc.

Special W1
Kloster Steel Corp.

Special W1 (0.80 to 1.20 C—Gr. 1)
Republic Steel Corp.

Special W1 (Gr. 1)
Universal-Cyclops Steel Corp.

Special W1
Ziv Steel & Wire Co.

Special Auto
Shock resisting tool steel, in two types. Type "A" contains C 0.30, Mn 0.75, Cr 0.90, Va 0.20. Type "D" contains C 0.50, Mn 0.75, Cr 0.90, Va 0.20. Republic Steel Corp.

Special 18 S1
Boyd-Wagner Co.

Special A. S. V. W1 (Gr. 1, 0.80 to 1.20 C)
Firth Sterling Inc.

Special Draco W2
Universal-Cyclops Steel Corp.

Special, Extra & Standard Carbon (Gr. 1-3) W1
Latrobe Steel Co.

Special HS-55
Special HS T1
Bethlehem Steel Co.

Special K D3
Special K5 A2
Special KCO D5
Special K. RM D4
U. N. Alloy Steel Corp.

Special M-O High Speed M2
Special Oil Hardening O1
Republic Steel Corp.

Special Oil Hardening O2
Jessop Steel Co.

Special Punch S4
Republic Steel Corp.

Special V W2
Braeburn Alloy Steel Corp.

Special V W2 (1.00 to 1.10 C)
Firth Sterling Inc.

Special W H21
Marathon Specialty Steels, Inc.

Special XX W1 (Gr. 1, 0.80 to 1.20 C)
Firth Sterling Inc.

Speed Cut P20
Vanadium-Alloys Steel Co.

Speed Star M2
Carpenter Steel Co.

Speedcut "Cushnd" Tool Bits
A high cobalt high speed ground tool bit with silver brazed copper shim to absorb shock. Lehigh Steel Corp.

SSC W1 (1.00 C)
Darwin & Milner Inc.

Staminal
Air or oil hardening shock resisting die steel with extreme toughness. Used for applications which operate in the range of Rockwell C 56-58 and where maximum toughness is required. Contains C 0.55, Si 1.00, Mn 0.90, Cr 0.40, Ni 2.70, V 0.13, Mo 0.45. Latrobe Steel Co.

Standard W1
Kloster Steel Corp.

Standard W1 (Gr. 3)
Universal-Cyclops Steel Corp.

Standard W1 (0.80 to 1.00 C—Gr. 3)
Republic Steel Corp.

Star Blue Chip T7
Firth Sterling, Inc.

Star Max M1
Carpenter Steel Co.

Star-Mo-M-2 M2
Firth Sterling Inc.

Starrett Precision Ground Die Stock OH O1
Starrett Precision Ground Die Stock WH W5
Starrett Precision Ground Die Stock AH A2
L. S. Starrett Co.

Star-Zenith T1
Star-Zenith Low Carbon H26
Stentor O2
The Carpenter Steel Co.

Sterling W1 (Gr. 3, .80 to 1.20 C)
Sterling V W2 (Gr. 3, 0.95 to 1.10 C)
Sterling XX W1 (Gr. 3, 0.90 to 1.00 C)
Firth Sterling Inc.

Summit
A Tungsten bearing, heat treated, stress relieved, machine straightened electric furnace alloy steel. Balanced alloy analysis to insure flexibility in further heat treatment if desired—can be water or oil quenched and carburized. Baldwin Steel Co.

Su-Pyr-Loy
A non-tempering steel with extreme toughness, high hardness and working ease. Pyramid Steel Co.

Super Alloy S1
Kloster Steel Corp.

Super DBL M36
Allegheny Ludlum Steel Corp.

Super High Speed Steel T1
Ziv Steel & Wire Co.

Super HiMo M30
Firth Sterling Inc.

Super Kinite D5
H. Boker & Co., Inc.

Super Mo-Chip
Super high speed steel, for difficult machining operations, containing carbon as required, Cr 4.00, Co 8.00, V 1.50, Mo 8.00, W 1.60, B 0.50. Firth Sterling Inc.

Super MoTung M30
Super MoTung Extra M33
Super MoTung Special M34
Universal-Cyclops Steel Corp.

Super Panther T5
Allegheny Ludlum Steel Corp.

Super Samson P4
The Carpenter Steel Co.

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

Super Star-Mo 2-5 M35
Firth Sterling Inc.

Super Superdie (D8)
An oil hardening high carbon high chromium steel containing C 2.25, Si 1.00, Cr 11.50, W 0.80, and V 2.25. Used for applications where increased abrasion resistance and the maintenance of a keen cutting edge are necessary. Columbia Tool Steel Co.

Super Unicut M15
Universal-Cyclops Steel Corp.

Superdie D3
Columbia Tool Steel Co.

Superior O1
Ackerlind Steel Co.

Superior 1 D3
Superior 1 FM D3
Free machining grade of the above.
Superior 2 D5
Superior 3 D2
Superior 3 FM D2
Free machining grade of the above.
Braeburn Alloy Steel Corp.

Supremus T1
Supremus Extra T2
Jessop Steel Co.

Suprimpacto P6
Atlas Steels Ltd.

Swed-Oil O1
Kloster Steel Corp.

T

T51
An oil hardening, cold or hot trimmer steel. Contains C 0.65, Mn 0.70, Cr 0.70, Ni 1.50, W 2.25. Heppenstall Co.

T71 S1
T72 (Mod.) S1
T73 H21
T74 (Mod.) S1
T75-Maxicut No. 2 T1
Heppenstall Co.

T77
An oil, air hardening steel for hot applications. Contains C 0.33, Mn 0.30, Cr 4.00, W 12.00, V 0.25, Si 0.30. Heppenstall Co.

T78-Maxicut No. 1 M2
T79 (Mod.) H14
A hot work tool and die steel. Heppenstall Co.

T716 S3
Heppenstall Co.

T717
A hot work tool and die steel. Contains C 0.33, Mn 0.30, Si 1.00, Cr 4.75, Mo 1.30, W 1.10. Heppenstall Co.

T719
A hot and cold work tool and die steel. Contains C 0.65, Mn 0.30, Si 1.00, Cr 4.75, Mo 1.50, W 1.10. Heppenstall Co.

T721-Thermotem 12 (Prehardened) H12

T721-Thermoneal 12 (Annealed) H12
Heppenstall Co.

T745
A cold work tool steel. Contains C 0.45, Cr-Mo-W. Heppenstall Co.

T746
A cold work tool steel. Contains C 0.67, Cr-Mo-W. Heppenstall Co.

T-Alloy A H21
T-Alloy H22
T-Alloy B H24
Braeburn Alloy Steel Corp.

TGS
An oil-hardening, non-deforming, carburizing steel for thread, ring and plug gages. Contains C 0.20, Mn 1.30 and Si 0.20.
T-K H21
The Carpenter Steel Co.

TSR
For brake die applications, a medium Carbon, Chrome, Molly alloy. Specially heat treated and triple stress relieved. St. Lawrence Steel Corp.

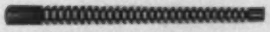
TIME-SAVING TOOLS

Minute Man
STANDARD
KEYWAY BROACH KITS

For cutting keyways in *one minute* for as little as *one cent* by hand with an arbor or hydraulic press. For keyways from 1/16" to 1" in any bore from 1/4" to 3". Individual keyway broaches also available. Write for catalog and price list.

Minute Man
STANDARD

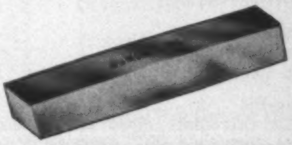
SQUARE BROACHES



HEXAGON BROACHES

ROUND BROACHES

Used in an arbor or hydraulic press for finishing holes to exact size in *one pass.* In stock for 1/8" to 3/4" squares and hex's and 1/4" to 1" rounds. Production Type Keyway Broaches also in stock. Write for catalog and price list.



du MONT TOOL BITS

Hold a keener cutting edge longer because toughness, red hardness and wear resistance are all in precise balance. High Speed, ground square and rectangular in all standard sizes. Write for Comparison Chart, Size and Price List.

Minute Man
MAGNETIC
BASES

Save set up time in holding dial indicator gages. Universal Joint Swivel permits positioning indicators on a 180° vertical swing, 360° horizontal swing. Alnico magnet has 50 lb. grip on all four sides. Write for folder.

Address all inquiries to Department IA

The duMONT CORPORATION
Greenfield, Mass. · Telephone PRescott 3-3674

For more data circle No. 177 on postcard, p. 213

Tamco S5
The Tool & Mfg. Co., Inc.

Tamco XL
A tool steel used for extreme tough cutting conditions and maximum resistance to fatigue and abrasion in pneumatic chisels, punches, and other types of pneumatic cutting tools. Contains C 0.58, Mn 1.00, Si 2.00, Mo 1.30, V 0.35, P and S 0.025 Max. The Tool & Mfg. Co., Inc.

Tantung
Cast-cobalt-chromium-tungsten alloys for metal cutting at speeds intermediate between those for H.S.S. and carbides; for applications requiring superior resistance to wear, to oxidation at elevated temperatures and to chemical corrosion. Vascoloy-Ramet Corp.

Tantung G
For general purpose machining of both ferrous and non-ferrous metals. It represents the best combination of hardness, strength and shock resistance for the majority of machining applications. Vascoloy - Ramet Corp.

Tantung 144
For machining when an alloy of still greater hardness than Tantung G is required and wear resistance to abrasion is of paramount importance and the absence of shock or impact will permit its use. Vascoloy - Ramet Corp.

Temperdie
Special analysis hot work for hot header dies, punches, hot press die, etc. Contains C 0.40, Mn 0.65, Cr 1.50, V 0.25, Si 0.30, Mo 1.00. Pennsylvania Steel Corp.

Tempo O1
Pennsylvania Steel Corp.

Tensiloy Cobalt-Tungsten HS T6
Tensiloy High Carbon-High Chrome D-2
Tensiloy High Speed T-2
Tensiloy Nitriding Die M1
Allied Steel & Chemical Co.

Tensiloy Non-Tempering
A water hardening alloy tool steel containing C 0.33, Mn 0.40, Si 0.65, Cr 0.75, Cu 0.75, Mo 0.75. Allied Steel & Chemical Co.

Tensiloy Oil-Hardening Die O1
Allied Steel & Chemical Co.

Ten Star M10
The Carpenter Steel Co.

Terra
A general machine shop oil hardening tool and die steel, that has safe-hardening non-warping, and non-shrinking qualities, easy to handle and work. Ludlow Steel Corp.

Terra Flat Ground Stock
Precision ground to smooth surface finish, ready for instant use for the most exacting applications. Ludlow Steel Corp.

Teton L7
Allegheny Ludlum Steel Corp.

Thermold A H11
Thermold AV H13
Thermold B H12
Universal-Cyclops Steel Corp.

Thermold J
A modified 5% chromium hot work steel intended for both hot and cold applications requiring unusual toughness. Contains C 0.50, Cr 5.00, V 1.00, Mo 1.40, Ni 1.50. Universal-Cyclops Steel Corp.

Thermold M
A hot work steel with good resistance to softening at elevated temperature. Contains C 0.40, Si 1.00, Cr 3.25, V 0.35, Mo 2.50. Universal-Cyclops Steel Corp.

Thor H23
Universal-Cyclops Steel Corp.

Tioga L6
Allegheny Ludlum Steel Corp.

Tool Grade W1 (0.80 to 1.00 C)
Republic Steel Corp.

Top Notch S1
Jessop Steel Co.

Torpedo O1
Lehigh Steel Corp.

Tough M L2
Bethlehem Steel Co.

Toughdie
Air hardening, shock-resistant, hot and cold punching, forming and riveting. Contains C 0.50, Mn 0.65, Cr 3.25, Mo 1.35, Si 0.25. Ziv Steel & Wire Co.

Tri-Mo D2
Uddeholm Co. of America, Inc.

Triple Die D3
Firth Sterling Inc.

Triton S2
Braeburn Alloy Steel Corp.

Tri-Tung D6
Uddeholm Co. of America, Inc.

Tri-Van D3
Uddeholm Co. of America.

Trojan T2
Atlas Steels Ltd.

Trudie D2
Trudie Special D5
The Champion Steel Co.

True-Fit
An extremely close tolerance key steel, furnished .001″ oversize in order to insure a snug fit. Pyramid Steel Co.

Truform O1
Jessop Steel Co.

Tru Headerdie
A cold heading die steel containing Vanadium to provide exceptionally long die life. Contains C 1.40, Mn 0.40, Si 0.35, Cr 0.15 max., Mo 0.10 max., V 3.50. Jessop Steel Co.

Tuncro S1
Atlantic Steel Corp.

Tru-Wear D7
Tru-Wear FM D7
Jessop Steel Co.

Tungsite
An all purpose tool room steel—has excellent shock resistance. Extremely versatile. Safe to handle due to wide quenching range. Pyramid Steel Co.

Tungsteel
A low Carbon, Chrome, Moly, Tungsten heat treated tool steel. Versatility is main feature. Recommended for highly stressed machine parts, short run dies and tools; unusual ductility at high hardness. Contains C 0.35, Mn 0.65, Cr 0.75, Mo 0.40, Si 0.35, W 0.45. St. Lawrence Steel Corp.

Tungsten Alloy
Brand of a line of carbides. Tungsten Alloy Mfg. Co., Inc.
(See "Carbides" following this section.)

Tungsten Special
A versatile tool steel. Can be oil or water quenched or carburized. Associated Steel Co.

Tungwin
A highly versatile, heat treated, tungsten-chromium-molybdenum alloy tool room steel. Can be hardened by quenching in oil or water and by carburizing or cyaniding. Baldwin Steel Co.

Turbine Alloy
A selected quality stainless and heat resisting chromium steel made primarily for the production of steel turbine blades and shrouding. Vanadium-Alloys Steel Co.

Twin Mo. M2
Twin Mo-Co M36
Twin Mo Va-3 M3
H. Boker & Co., Inc.

Twinvan T2
Braeburn Alloy Steel Corp.

Typlex
Chrome nickel molybdenum type. Ziv Steel & Wire Co.

U

UA-4
Shock resisting tool steel. Contains C 0.50, Mn 0.60, Cr 1.00, W 0.25, V 0.25. Republic Steel Corp.

UA-6
Shock resisting tool steel. Contains C 0.65, Mn 0.65, Cr 1.00, W 0.25, V 0.25. Republic Steel Corp.

UA-8 L7
Republic Steel Corp.

UHB W1 (1.00 C)
UHB-19 VA W2
UHB-46 O1
UHB-151 A2
UHB-711 S1
UHB Extra W1 (1.00 C)
UH Forma P1
UHB Orvar H13
UMB Premo P4
UHB Resisto S5
UHB Special H12
UHB-VA W2 (1.00 C)
Uddeholm Co. of America.

Ultimo-6
A shock resistant steel, for cold or hot shearing applications. Contains C 0.55; Mn 0.55; Si 0.80; Cr 1.00; Mo 0.75; Ni 1.60. Atlas Steels Ltd.

Ultradie 1 D3

Ultradie 1M D4
Ultradie 3 D2
Universal-Cyclops Steel Corp.
Unalloy T-1 T1
Unalloy T-2 T2
Unalloy T-4 T4
Unalloy T-5 T5
Unalloy T-6 T6
Unamo-1 M1
Unaspeed-2 M2
Unavan-3 (Type 1) M3
Unavan-4 M4
Unavan-10 M10
Unity M-35 M35
U. N. Alloy Steel Corp.

Unico
Water hardening steel, for chisels, shear blades, punches, etc. Is extra tough. Contains Mn 0.30 to 0.40, Si 0.30 to 0.40, Cr 0.70, W 1.30. Hidalgo Steel Co.

Unicut M3
Universal-Cyclops Steel Corp.

Unison
A non-tempering tool steel where shock resistance is required for general purpose applications ranging from arbors to well bits. Erie Steel Co.

Universal Stainless
A general purpose, high tensile, close tolerance ground and polished stainless shafting steel. Recommended for tough applications requiring resistance to corrosion and fatigue. St. Lawrence Steel Corp.

U. S. Ultra H11
U. S. Ultra 4 H12
U. S. Ultra 2 H13
U. N. Alloy Steel Corp.

Utex O1
The Diehl Steel Co.

Utica O7
Allegheny Ludlum Steel Corp.

Utility W1
Lehigh Steel Corp.

V

V-76 S5
Kloster Steel Corp.

V. D. C. H13
Latrobe Steel Co.

V.D. Chisel Steel
A water hardening C-Mo tool steel, especially suited for hand and pneumatic chisels. Joseph T. Ryerson & Son, Inc.

V. D. Tool Steel W2 (1.00 C)
Joseph T. Ryerson & Son, Inc.

V-HW H13
Republic Steel Corp.

Van Chip M3
Firth Sterling, Inc.

Van Cro-12 D2
St. Lawrence Steel Corp.

Van Cut M3
Van-Lom M10
Vanadium BB L3
Vanadium Alloys Steel Co.

Vanadium Autodie W2 (Gr. 4)
Vanadium Castdie H13
Vanadium Castdie Smoothcut H13
Vanadium Electrex W2 (Gr. 4)
Vanadium Extra W2 (Gr. 2)
Vanadium Firedie H13
Vanadium Firedie Smoothcut H13
With Free Machining Additives.
Vanadium Standard W2 (Gr. 3)
Columbia Tool Steel Co.

Vanadium Types L2
Vanadium-Alloys Steel Co.

Vanite High Speed T2
Columbia Tool Steel Co.

Vasco Jet 1000 H11
Vasco M-2 M2
Vasco Supreme T15
Vasco Supreme A M15
Vanadium-Alloys Steel Co.

Vascoloy-Ramet
Brand name of a line of carbides. Vascoloy-Ramet Corp. (See "Carbides" following this section.)

Vega A6
The Carpenter Steel Co.

Venango S2
Universal-Cyclops Steel Corp.

Venango Special
A shock resisting Steel offering better wear resistance than the conventional S2 type. Contains C 0.65, Mn 0.50, Si 1.10, V 0.20, Mo 0.50. Universal-Cyclops Steel Corp.

Veresta V O1
Marathon Specialty Steel, Inc.

NEED
TOOL and DIE
STEEL?
call your
Latrobe Steel Service Center
for prompt
Metalmaster Service

- Desegatized® XL® High Speed Steels
- Desegatized® FM High Production Die Steels
- Extrusion Die Steels
- Cold Heading Die Steels
- Die Casting Die Steels
- Water Hardening Die Steel
- Oversize Flat Ground Die Steels
Oil and Air Hardening
- Tool Bits and Drill Rod

LATROBE Metalmasters

LATROBE STEEL COMPANY
LATROBE, PENNSYLVANIA

Steel Service Centers located at:
BOSTON, BUFFALO, CHICAGO, CLEVELAND, DAYTON, DETROIT, HARTFORD, LOS ANGELES, MIAMI, MILWAUKEE, NEW YORK, PHILADELPHIA, PITTSBURGH, SAN LEANDRO, TOLEDO

For more data circle No. 178 on postcard, p. 213

Veribest Drill Rod O1
Diehl Steel Co.

Very Best W4
Boyd-Wagner Co.

Vibro S1
Braeburn Alloy Steel Corp.

Victor Drill Rod W1
Crucible Steel Co. of America.

Victory M2
Lehigh Steel Corp.

Viking L7
Vinco T1
Vinco Hot Work H26
Braeburn Alloy Steel Corp.

Viscount 20 Free Machining H13
Viscount 44 Pre-Hardened, Machinable H13
Latrobe Steel Co.

VLM M10
VLM-EZ M10
Allegheny Ludlum Steel Corp.

V.O.H.
A special analysis, electric furnace, oil hardening die steel. Free cutting, safe hardening, non-warping; with exceptional toughness and high hardness combines. Used for production dies including blanking, forming, stamping, punching, drawing; also shear blades, taps, bits, bushings, etc. Available in solid bars, forgings, seamless tubing, and precision ground flats. Vulcan Steel Corp.

V.R.T.
A high C, high Chromium, Vanadium, electric furnace, air hardening die steel. Easily machines; non-deforming; affords high hardness and resistance to severe abrasion, shock, and impact. Recommended for long-run production dies. Vulcan Steel Corp.

Vulcaloy
A medium, C, Cr, Mn, Mo, Si, Cu, water hardening tool steel. Highly resistant to shock and abrasion; an excellent tool steel for chisels, pavement breakers, bars, punches, dies, etc. It Requires No Tempering. Vulcan Steel Corp.

Vulcamatic
A high Silicon, Mo, V, Mn, electric furnace oil hardening tool steel; excellent resistance to severe shock, fatigue, and abrasion. Used for pneumatic tools, dies, shear blades, punches, etc. Vulcan Steel Corp.

Volcano H12
Lehigh Steel Corp.

Vulcan-Kidd 4-HW
A chromium hot work steel that has more than fulfilled a need for a better, more uniform hot gripper die steel. It is also suitable for other hot work applications and some cold work applications. Contains C 0.95, Cr 4.00, V 0.75, Mo 0.45. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd 6-HW
A chromium hot work steel which has a combination of good toughness, red hardness, and resistance to heat checking. Contains C 0.60, Cr 4.00, V 0.75, Mo 0.45. It is suitable for a variety of applications in hot work dies requiring great toughness. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd 30 Calo Ferro H21
Vulcan-Kidd 50 Calo Ferro H24
Vulcan-Kidd 4870 S4
Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd A-41
A steel outstanding for applications involving both heat and shock. It performs well for hot work applications requiring high toughness and very high resistance to heat checking where higher alloy types fail by heat checking and cracking. Contains C 0.45, Cr 1.60, Mo 1.10, V 0.25. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd A-42 H21 Mod.
Vulcan-Kidd Alidie D2
Vulcan-Kidd Alidie FM D2-FM
Vulcan-Kidd Ajax Drill Rod W1
Vulcan-Kidd Auto L2
Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd BFW
A fine-grained deep-hardening oil-quenching steel with exceptionally high toughness and good wear resistance, developed for tough jewelry dies. It is used successfully on many high-shock applications. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd Blue Edge S3
Vulcan-Kidd Croloy D2
Vulcan-Kidd Extra W1
Vulcan-Kidd Fort Pitt W1
Vulcan-Kidd Hardrite O7
Vulcan-Kidd Hecla L2
Vulcan-Kidd Hecla Special L2 Mod.
Vulcan-Kidd Hi-Pro D3
Vulcan-Kidd K. R. W5
Vulcan-Kidd Keystone Drill Rod O1
Vulcan-Kidd Magal H11
Vulcan-Kidd Nicroman L6
Vulcan-Kidd Non-Shrinkable O2
Vulcan-Kidd Oil-Hard (Mansil) O1
Vulcan-Kidd Plastic Die P1
Vulcan-Kidd Q. A. S1
Vulcan-Kidd RMK H13 Mod.
Vulcan-Kidd Special W1
Vulcan-Kidd Special Vanadium W2
Vulcan-Kidd Striking Die W1
Vulcan-Kidd Super T2
Vulcan-Kidd Superior Chrome L1
Vulcan-Kidd TCM H12
Vulcan-Kidd TM-6 M2
Vulcan-Kidd TM-6 F.M. M2-FM
Vulcan-Kidd TM-6 Low Carbon H42
Vulcan-Kidd Tru-Cor Drill Rod W1
Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd Tusca
A shock resisting die steel designed particularly for striking dies where good hubbability and oil hardening characteristics are desirable. Its most popular usage has been in the jewelry and tableware industry. Other applications for shock tools have proven satisfactory. Contains C 0.50, Mn 0.60, Cr 1.30, Mo 0.30, V 0.25. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd Vairloy A4
Vulcan-Kidd Variloy FM A4-FM
Vulcan-Kidd Vanadium Striking Die W2
Vulcan-Kidd Vul-Bro M3
Vulcan-Kidd Vulcast H13
Vulcan-Kidd Vuldie A2
Vulcan-Kidd Vuldie F. M. A2-FM
Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd VULground R
A precision ground gage and die steel available in the popular O1, A2, and D2 types. Vulcan-Kidd Steel Div.

Vulcan-Kidd Vul-Max
A high nickel hot work steel designed for use in Maxi-Press operations. It is readily machinable. Contains C 0.40, Cr 1.60, V 0.20, Mo 0.85, Ni 4.50. Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulcan-Kidd Vul-Mo M1
Vulcan-Kidd Vulmold P2
Vulcan-Kidd Wolfram T1
Vulcan-Kidd Wolfram Cobalt T4
Vulcan-Kidd Wolfram Low Carbon H26
Vulcan-Kidd Steel Div., H. K. Porter Co., Inc.

Vulco Brake Die
A medium C, Cr, Mn, Mo, alloy steel for brake die applications. Ideally heat treated, machine straightened and multi-stress relieved for ease in machining with excellent non-warping qualities. Excellent for resistance to severe abrasion and high impact. Available in solid bars and forged to order. Vulcan Steel Corp.

Vulco Forging Quality
A unique chemistry, electric furnace alloy steel for simplified forging of parts requiring ultra high strength for maximum safety and service. Manufacturing processes permit fine grain yield for exceptional ductility and machining ease. Can also be readily welded without embrittlement. Vulcan Steel Corp.

Vulco H. T.
A high Ni, medium C, Cr, Mn, Mo, V, electric furnace alloy steel. Special processing includes heat treating, multistress relieving and machine straightening. A free cutting, extremely high tensile strength alloy, excellent for highly stressed shafting and machine parts. Available in all sizes. Vulcan Steel Corp.

Vulco P. G.
Turned, Ground and Polished shafting with mirror finish and accurate tolerances. Combines a unique chemistry of medium C, Cr, Mn, Mo, Ni, with heat-treatment, multi-stress relieving and machine straightening; is free cutting and has an extremely high tensile strength. Vulcan Steel Corp.

Vul-Tuff H. T. Wear Plate
A heat treated medium C, Si, Mo, Cu, Mn alloy plate with excellent resistance to severe abrasion, impact, and vibration. Welds easily; used primarily for hoppers, wheelabrators, chutes, liners, etc. Outlasts mild carbon plate from 3 to 8 times. Vulcan Steel Corp.

W

W4X H12
Furnished in both annealed and

For More Data

Symbols at right margins are AISI designations. See Section I for chemistry, heat treating and forging data.

heat treated condition. A. Finkl & Sons Co.

WCC
A hot work die steel containing W 4.25, Cr 4.25, Co 4.25, and V 2.10. Vanadium-Alloys Steel Co.

W. C. R. H16
Firth Sterling, Inc

WE 5 P4
WE Extra P1
Marathon Specialty Steels, Inc.

WKD H26
U. N. Alloy Steel Corp.

WKL L1
Marathon Specialty Steels, Inc.

WKZ H21
U. N. Alloy Steel Corp.

WS 1 Extra F1
Marathon Specialty Steels, Inc.

Wando O1
Universal-Cyclops Steel Corp.

Warplis Drill Rod O1
Rounds, flats and squares.
Warplis Ground Flat Stock O1
Pittsburgh Tool Steel Wire Co.

Washington W1
Washington Special W2
Jessop Steel Co.

WATERcrat W1
Marshall Steel Co.

Waterdie Extra W5 (Gr. 2)
Waterdie Standard W5 (Gr. 3)
Columbia Tool Steel Co.

Wear-Ex
Alloy tool steel for filler bar applications. Available in wide range of sizes and shapes for on the job applications. Pyramid Steel Co.

Wesson
Brand name of a line of carbides. (See "Carbides" following this section.) Wesson Co.

White Label D2
White Label S D3
Peninsular Steel Co.

White Label W1
Swedish-American Steel Corp.

White Label W1 (0.90 C)
A. Milne & Co.

Willey
Brand name of a line of carbides. Willey's Carbide Tool Co. (See "Carbides" following this section.)

Windsor A2
Windsor (FM) A2 (FM)
Jessop Steel Co.

Wizard
An oil and water hardening steel, for pneumatic chisels, shock tools, chisels, etc. Contains C 0.45, Mn 0.35, Si 0.30, Cr 0.80, W 0.85. Agawam Tool Co.

Wizard S1
Ziv Steel & Wire Co.

WW Hotwork H23
Vanadium-Alloys Steel Co.

X W1
Bethlehem Steel Co.

XCL W1
Bethlehem Steel Co.

XDH H26
XDL H25
XDM H26
Firth Sterling, Inc.

XL Chisel Alloy Tool S1
Latrobe Steel Co.

XX W1
Bethlehem Steel Co.

XX Superior
Hot work tool steel, chromium base type. Contains C 0.90, Cr 4.00, Mo 0.45, V 0.75. Republic Steel Corp.

Yellow Label W1
Ackerlind Steel Co

Yellow Label O1
Peninsular Steel Co.

Zip
An oil hardening steel, for lathe, planer, shaper tools for cutting and machining cast steel. Contains C 0.65 to 0.70, Mn 0.30, Si 0.35, Cr 4.00, Co 7.00 to 8.00, V 1.50 to 1.75, W 17.00 to 18.00, Mo 0.70 to 1.00. Agawam Tool Co.

Zip High Speed Steel T5
Zivco W1
Zivco Vanadium W2
Ziv Steel & Wire Co.

For more data circle No. 179 on postcard, p. 213→

From VULCAN-KIDD "TOOL STEEL SERVICE CENTERS"

AISI TYPE	VULCAN-KIDD GRADE
HIGH SPEED	
M-1	Vul-Mo
M-2	TM-6*
M-3	Vul-Bro
T-1	Wolfram
T-2	Super
T-4	Wolfram Cobalt
HOT WORK	
H-13 M	RMK
H-13	Vulcast
H-12	TCM
H-11	Magal
H-26	Wolfram Low C.
H-24	50 Calo Ferro
H-21 M	A-42
H-21	30 Calo Ferro
H-42	TM-6 Low C.
TOOL AND DIE	
D-2	Alidie*
D-2	Croloy
D-3	Hi-Pro
A-2	Vuldie*
A-4	Vairloy*
O-7	Hardrite
O-1	Oil-Hard (Mansil)
O-2	Non-Shrinkable

AISI TYPE	VULCAN-KIDD GRADE
SHOCK AND SPECIAL PURPOSE	
S-1	Q. A.
L-2	Hecla
L-2 M	Hecla Special
S-3	Blue Edge
L-6	Nicroman
S-4	4870
L-1	Superior Chrome
L-2	Auto (.50 C)
PLASTIC MOLD	
P-2	Vulmold
P-1	Plastic Die
CARBON AND CARBON VANADIUM	
W-2	Special Vanadium
W-1	Special
W-2	Van. Striking Die
W-5	K. R.
W-1	Extra
W-1	Striking Die
W-1	Fort Pitt

*Available as free machining.

Other grades available for special applications. Also Vulground precision oil and air hardening gage and die steel to save tooling time and costs.

For your Tool Steel requirements call
VULCAN-KIDD
"TOOL STEEL SERVICE CENTERS"

BRIDGEPORT, CONN.
Bridgeport Steel Company
1034 Bridgeport Ave.
(Milford, Conn.)
Trinity 4-2591

CHICAGO 12, ILL.
H. K. Porter Co., Inc., Vulcan-Kidd Steel Div., 259 N. California Ave. Van Buren 6-1028; TWX CG. 1496

INDIANAPOLIS 21, INDIANA
H. K. Porter Co., Inc., Vulcan-Kidd Steel Div., 1601 Oliver Ave. Melrose 2-1300

CAMBRIDGE 38, MASS.
H. K. Porter Co., Inc., Vulcan-Kidd Steel Div., 61 Moulton St. Eliot 4-2620; TWX Camb. Mass. 180

DETROIT 20 (Ferndale), Mich.
H. K. Porter Co., Inc., Vulcan-Kidd Steel Div., 1521 E. 8 Mile Road. Jordon 6-6380;TWX Roy. 1147; Lincoln 5-1100

LANSING, MICHIGAN
H. K. Porter Co., Inc., Vulcan-Kidd Steel Div., 4171 E. Delhi Ave. (Holt, Mich.) Oxford 9-2756

NEWARK 5, NEW JERSEY
(New York Metropolitan Area) Grammer, Dempsey & Hudson, Inc., 212 Rome St. (Newark) Market 2-5900. (New York) Worth 2-7810. (Jersey City) Hend'rs'n 4-8216

PATERSON 2, NEW JERSEY
Passaic County Steel Service, Inc., 21 N. First St. Lambert 3-1111

PHILADELPHIA 34, PA.
Steel Distributors, Inc., Cedar & Westmoreland Sts., Garfield 3-9300

PITTSBURGH, PENNA.
H. K. Porter Co., Inc., Vulcan-Kidd Steel Division, Aliquippa, Pa. (Pittsburgh) Poplar 6-6762; TWX 64 (Aliquippa) Essex 5-6621.

VULCAN-KIDD PORTER STEEL DIVISION

H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Carbide Brands, Their Types and Uses

Carbide grades available from U. S. producers for various tool and die applications, as reported to The IRON AGE.

Adamas Carbide Corp.

A (tools) General purpose grade with low cobalt content, having high hardness and good wear resistance. Recommended for general machining of cast iron, non-ferrous materials and the series 300 stainless steels. This grade often works very well in machining steel where edge wear is the only problem and where no cratering is encountered, (very fine feeds and small depth of cut). Also used for steel cutting in applications such as reaming and fine finish counterboring.

AA (tools) The very low cobalt content of this grade makes it suitable for light finishing cuts on cast iron and non-ferrous material where no shock is encountered. Recommended for precision boring and fine finish turning.

AAA (tools) The extremely low cobalt content of this grade makes it suitable for precision finishing and boring where absolutely no shock is encountered. Recommended for fine precision boring and finish turning.

B (tools) Slightly higher cobalt content than Grade A, which increases the strength with little change in hardness and wear resistance. Ideal for heavy roughing cuts on cast iron and non-ferrous materials. Best grade for alloy, cast iron, and chill iron castings. Most popular grade for twist drill tips and masonry drill tips.

BB (tools) The medium percentage of cobalt makes this grade suitable for wear applications where strength is required. Also can be used for light impact applications. Ideal for heavy or interrupted cuts at slow speeds on cast iron and non-ferrous materials. Recommended grade to be used on older machine tools which do not have the rigidity and horsepower to effectively use harder grades. Also used in certain mining tools.

434 (tools) Premium steel machining grade, highly recommended for tough machining applications on steel where heavy feeds are used. Also recommended for interrupted cuts with heavy feeds. This grade has excellent shock and wear resistance, combined with good crater resistance. Recommended for machining steel with heavy feeds (min. .015 to .020) over a wide range of speeds.

D (tools) Medium cobalt and medium titanium carbide content. This combination gives an excellent general purpose grade for steel which has excellent strength and crater resistance, as well as good wear resistance. Ideal for machining steel from the semi-roughing to semi-finishing range. Can be used with coarse feeds and heavy depth of cut on mild steel. Highly recommended for milling. This grade can be used for heavy roughing with solid inserts.

C (tools) Medium cobalt and high titanium carbide content. This combination produces a grade very high in crater resistance with good strength and good resistance to edge wear.

548 (tools) Premium steel machining grade. Excellent combination of strength, wear and crater resistance for medium and light machining. Excellent for interrupted finishing cuts. Recommended for machining tough alloy steels on finishing or light roughing operations, with or without interrupted cuts.

CC (tools) Low cobalt and high titanium carbide content. This combination produces a very hard grade with high crater and high wear resistance. Recommended for precision boring and turning applications on steel.

GG (tools) High cobalt and extremely high tantalum content for extreme shock resistance to withstand severe interrupted cuts. Due to its high tantalum content, it is suitable for extremely heavy roughing cuts on steel. Should be used only on heavy work if all other grades, including Grade 474, do not work. Very easy to braze and grind.

474 (tools) Special purpose grade. Has a high cobalt and medium tantalum carbide content for tough interrupted cuts on steel. Can be used on a wide feed range, but on a limited medium speed range. This grade is a modification of Grade GG. It will give better wear resistance than GG and still has much of the lubricating quality and shock resistance imparted by the tantalum carbide.

A (dies) Used in wire drawing for small diameter steel drawing. Also for non-ferrous wire drawing applications over .020. Also used for compacting dies.

AAA (dies) Used for very small drawing dies—for non-ferrous wire. For drawing coated ferrous wire. Used for fine wire drawing for the screen industry.

B (dies) For nonferrous and ferrous wire drawing, light cupping and light deep drawing applications. Very light blanking operations. Compacting dies. Small and medium wire straightening dies.

BB (dies) For cold drawing steel rods, bars and tubing. Also used for deep drawing and cupping. Most commonly used grade for tube drawing mandrels. For sheet metal dies and blanking dies. Light heading and cold extrusion dies. Quills and cut-off knives. Medium and large wire straightening dies.

HD-15 (dies) Lamination punches and dies. Heading and cold extrusion dies. Large tube drawing mandrels and small nail gripper dies. This is the standard hot pressing grade.

HD-20 (dies) For heading die applications and die applications where strength is the prime factor, such as punches with unsupported sections. It is also used for heavy bolt sizing and cold heading hammers, smaller swaging dies, large nail gripper dies.

HD-20-T (dies) For heading die applications and die applications where strength is the prime factor, such as punches with unsupported sections. It is also used for heavy bolt sizing and cold heading hammer, smaller swaging dies, and large nail gripper dies. Use this grade for the above applications instead of HD-20 only if galling and seizing is a problem.

HD-25 (dies) Although is is only slightly harder than the hardest steel, this grade will be more wear resistant and much stronger for impact. For tough applications of large size cold heading and swaging. It is also used for large nail gripper dies because of its fatigue resistance. This grade is easily machined. The I.D. hole can be drilled with Grade AA carbide.

HD-25-T (dies) Although it is only slightly harder than the hardest steel, this grade will be more wear resistant and much stronger for impact. Used for tough applications, large size cold heading and swaging. It is also used for large nail gripper dies because of its fatigue resistance. This grade is easily machined. The I.D. holes can be drilled with Grade AA carbide.

Use this grade for the above applications, instead of HD-25 only if galling and seizing is a problem.

502 (Mining and rock drilling) A straight tungsten carbide grade with medium cobalt content. A special coarse grain tungsten is used in this grade. This grade was developed specifically for impact applications. Its coarse grain structure imparts a very high transverse rupture strength, and the relatively low cobalt content gives good wear resistance.

569 (Mining and rock drilling) This grade was devised specifically for mining and rock drilling applications where wear resistance is more important than shock resistance. This grade has a special grain structure to maintain a high transverse rupture strength, and therefore, permits a lower cobalt content to increase the wear resistance.

Allegheny Ludlum Steel Corp. Carmet Grades

CA-3 For cast iron, nonferrous metals and non-metallics. Tougher than CA-4 below. It is a general purpose grade and most desirable for an inexperienced operator. Because of its higher strength and lower hardness, CA-3 will withstand intermittent and roughing cuts on the above materials.

CA-4 is lower in toughness but harder than CA-3. It is, therefore, more resistant to wear, although less resistant to shock. The selection of CA-4 is indicated for faster and lighter finishing than with CA-3. It may be used for rough-machining softer metals at moderate speeds and for light, interrupted cuts.

Both CA-3 and CA-4 are primarily for machining cast iron, nonferrous metals and non-metallics. However, they may also be used for light finishing cuts on steel.

CA-7 is higher in hardness but lower in strength than CA-4. It is used where greater wear resistance but less shock resistance is required, such as light cuts on unusually hard cast iron. Grades CA-7, 8 and 9 are for machining cast iron, nonferrous metals nan non-metallics.

CA-8 is less tough but harder than CA-7. It is used where high resistance to wear is required for light, precision cuts.

CA-10 is used for light duty blanking dies and punches, deep drawing die inserts and punches, light shock wear application or light impact. It is generally used on mine tools. This and the following three grades are for punches, dies and wear parts with impact or shock.

CA-11 is lower in hardness but stronger than CA-10. It is used for lamination blanking punches and dies on silicon steel, heavy shock wear applications, or medium impact.

CA-12 is harder than but not as strong as CA-10, although stronger than CA-3. It is used for heavy duty turning on cast iron, light duty mine tools, and deep drawing dies.

CA-51 is the strongest Carmet grade that is used for cutting tools. Typical applications are for tools of high speed planers on cast iron or "Semi-steel" castings; and for turning tools when heavy interrupted cuts are taken in steel with speeds lower than normally recommended for carbide tools. It is particularly desirable for blanks used in "clamper-on" rigid holders.

CA-210 Carmet grade is a ten per cent cobalt grade of cemented tungsten carbide developed for percussion rock-drilling under highly abrasive conditions.

CA-225 is recommended for conditions of heavy impact. CA-225 is an exceptionally fine material for cold hearing dies, cold forming, coining dies and similar applications requiring resistance to severe shock.

CA-604 is a super high speed cutting carbide operating in the fast-cutting ceramic area. Available in Indexable blanks, CA-604 will give extra long wear on operations like precision boring and turning where size tolerances and surface finishes must be held.

CA-605 is recommended for exceptionally high resistance to edge wear and for precision boring and light fast cuts on steel.

CA-606 is recommended for light machining on steel and boring where high resistance to edge wear is needed, and good resistance to cratering is required.

CA-610 is recommended for heavy rough cuts on steel. Carmet grade CA-610 covers most general steel machining applications. It has a wide practical range of speeds and feed and is an ideal grade to use when vibration or old machines must be considered.

CA-815 Carmet grade is a material containing chromium carbide and 15% nickel. While it is less strong than cemented tungsten carbides, it has the valuable properties of excellent corrosion and oxidation resistance and good abrasion resistance. It is being widely used for hot extrusion dies on brass and aluminum and for precision gage blocks.

Armstrong Bros. Tool Co.

Armide Grade 78 — for average steel cutting.

Armide Grade 78B—for steel roughing and general purpose.

Armide Grade 350—for light roughing and general finishing of steel.

Armide Grade 370—for heavy duty roughing and interrupted cuts and general machining of steel.

Armide Grade 883—for cast iron and nonferrous work.

DoAll Co.

DO-1 Cast iron, nonferrous, and nonmetallic grade recommended for heavy feeds, interrupted cuts.

DO-2 General purpose cast iron, nonferrous, non-metallic cutting grade. High crater and wear-resistance.

DO-3 Particularly suited to do light finishing cuts with fine feeds and high speeds on harder, more abrasive resistant materials. Hardest, most wear-resistant grade for machining these types of materials.

DO-5 Strongest steel cutting grade. Recommended for heavy duty machining and the severest interrupted cuts.

DO-6 General purpose steel cutting grade. High crater and wear-resistance.

DO-7 Steel cutting finishing grade for medium and light machining.

DO-8 For precision boring and for high speed light finishing cuts—steel cutting grade. Uninterrupted cuts. Hardest steel cutting grade.

DO-16 A premium, tough, heat-resistant steel cutting grade. Will resist high temperatures encountered in heavy duty machining and interrupted cuts.

Firth-Loach Metals, Inc.

FA-3 (tools) Heavy roughing, or interrupted cutting on cast iron, nonferrous and non-metallic materials. Woodcutting application. Shock resistant. Contains WC and Co. RA 88.5.

FA-4 (tools) Heavy roughing, or light interrupted cutting on cast iron, nonferrous and non-metallic materials. Medium high shock resistant grade. Contains WC and Co. RA 90.0

FA-5 (tools) General machining and wear resistant applications on cast iron, nonferrous and non-metallic materials. Medium high shock resistant, medium low wear resistant. Contains WC and Co. RA 91.0.

FA-6 (tools) General purpose machining. Roughing and finishing cast iron, nonferrous and non-metallic materials. Crater and wear resistant. Medium shock and wear resistant. Broad scope of application. Contains WC, Co and TaC. RA 91.5.

FA-61 (tools) Modification of FA-6, with greater shock resistance. Recommended for General purpose milling of cast iron, non-ferrous, and nonmetallic materials. Contains WC, Co and TaC. RA 91.0.

FA-7 (tools) Finishing cuts on cast iron and harder more abrasive nonferrous materials. Lower shock resistant than FA-5 and FA-6 but high edge wear resistant. Contains WC and Co. RA 92.2.

FA-8 (tools) Fine precision finishing cuts on cast iron and the hardest and most abrasive nonferrous and nonmetallic materials. Low shock resistant. Hardest and most wear resistant of the FA series of carbides. Contains WC and Co. RA 92.6.

FT-2 (tools) Heavy interrupted cuts on steel with lower speeds than normally recommended for carbide tools. Also for high speed planers on cast iron or "semi-steel castings." High strength for this series. Contains WC, Co and TaC. RA 90.0.

FT-3 (tools) Heavy roughing or interrupted cutting on steel and steel alloys. Medium high shock resistant, medium wear resistant, and crater resistant. Contains WC, Co and TiC. RA 90.0.

FT-4 (tools) General purpose machining with average machining conditions on steel and steel alloys. Resistant to medium shock, high wear and crater. Good edge wear. Contains WC, Co, TaC, and TiC. RA 91.0.

FT-41 (tools) In same application and machining category as FT-4. Developed for the purpose of resisting severe conditions in this range. Much more resistant to thermal shock when applied on heavy turning operations where coolants are applied. Excellent for mechanically held inserts and dry machining. Contains WC, Co, TaC and TiC. RA 90.5.

FT-5 (tools) Special purpose grade for very severe and abnormal conditions. Same application range as FT-4 and FT-41. Recommended for performing at elevated machining temperatures with heavy feed loads, and for dry machining. Very good edge wear and high resistance to deformation. Contains WC, Co, TaC and TiC. RA 91.0.

FT-6 (tools) Fine finishing and light roughing on steels and steel alloys. Hard and wear resistant. Medium shock and high heat and crater resistant. Contains WC, Co and TiC. RA 92.0.

FT-61 (tools) Same category as FT-6, but with more resistance to chipping due to thermal shock. Lower in abrasive resistance and higher in shock resistance than FT-6. Recommended for mechanically held inserts. Contains WC, Co, and TiC. RA 91.5.

FT-7 (tools) Precision boring, light finishing. High speed precision finishing on hard steels and steel alloys. Hardest and most wear resistant of FT series. Low shock resistant. Contains WC, Co and TiC. RA 92.5.

FT-8 (tools & dies) Special purpose wire drawing. General purpose for machining uranium. Contains WC, Co, and TaC. RA 91.0.

FT-9 (tools & dies) Heavy duty machining under severe conditions at elevated temperatures, such as scarfing. For heavy gauge forming dies where metal pickup occurs. Contains WC, Co, and TaC. RA 88.0.

FH-2 (heading dies) High impact resistance and strength for severe applications. Contains WC, Co, and TaC. RA 82.5.

FH-3 (heading dies and punches) High impact resistance and strength. Contains WC, Co and TaC. RA 84.0.

FH-4 (heading dies and punches) High impact resistance and strength. Contains WC, Co and TaC. RA 86.0.

FH-5 (heading dies and punches) High shock resistance. High degree of toughness. Harder than FH-3 and FH-4. Contains WC and Co. RA 88.0.

FH-6 (heading dies and punches) High shock resistance. Contains WC and Co. RA 88.5.

FB-3 (banking dies and punches) For heavy punches and die sections which must withstand heavy shock. Contains WC, Co and TaC. RA 86.0.

FB-4 (blanking dies and punches) Grade most extensively used for general work. Contains WC and Co. RA 88.0.

FB-5 (blanking dies and punches) For slitter knives, wear parts and punches for thicker metals. Contains WC and Co. RA 88.5.

FB-6 (blanking dies and punches For small rolls, wear parts and punches for blanking thin, ductile materials. Contains WC and Co. RA 91.0.

FD-3 (dies) For drawing wire, tube and bar stock. Good wear resistance. and high degree of toughness. Contains WC and Co. RA 88.5.

FD-4 (dies) For drawing wire, tube and bar stock. Good wear resistance. Contains WC and Co. RA 90.5.

FD-5 (dies) For drawing wire, tube and bar stock. Medium high shock resistance and low wear resistant. Hardest and most edge wear resistant in the FD series. Contains WC and Co. RA 91.0.

FM-2 (mining) Percussion applications, rock drilling. Contains WC and Co. RA 86.2.

FM-3 (mining) Rotary drilling. Contains WC and Co. RA 87.2.

FM-4 (mining) Auger bits, undercutters. Contains WC and Co. RA 88.5.

FM-5 (mining) Rotary drilling, auger bits, coal mining. Contains WC and Co. RA 89.0.

FM-6 (mining) Rotary drilling, auger bits, coal mining. Greater resistance to shock. Contains WC and Co. RA 89.8.

Firth Sterling Inc.

H (tools wear resisting applications) Straight tungsten carbide grade. Shock resistant material adapted to interrupted cuts on cast iron or nonferrous alloys and plastics. Ideal for "wear proofing applications." RA 91.

HA (tools) Straight tungsten carbide grade. Best general purpose grade for machining materials of crystalline structure and non-metallics. Combines a maximum of wear resistance and crater resistance for machining and milling alloy irons, cast alloys, hardened and stainless steels and tungsten. RA 91.5.

HE (tools) Straight tungsten carbide grade particularly suited to light finishing cuts with fine feeds and high speeds on harder, more abrasive nonferrous materials. High edge wear resistance. Harder and more abrasion resistant than HA, but not as strong. RA 92.

HF (tools and dies) Straight tungsten carbide grade. Precision boring and fine finishing operations on the hardest, most abrasive nonferrous and non-metallic materials. Should be used with light steady cuts, finest feeds and highest speeds. It is the hardest, most wear resistant tungsten carbide grade. Also used in small wire dies where the highest resistance to abrasion is essential. RA 92.5.

T-04 (tools) Tungsten - tantalum - titanium carbide grade. A "universal" carbide grade ideally suited to heavy duty cutting, interrupted cuts on boring mills, engine lathes and general machine shop work when cutting steel or cast iron. Resistant to galling, pickup and cratering. RA 90.

NTA "Premium" quality tungsten-tantalum - titanium general purpose heavy duty grade. Has broader range of application than conventional grades. Excellent balance between edge wear and cratering. Good for heavy duty steel cutting and also high speed turning. RA 91.

TXA (tools) Tungsten-titanium carbide grade. Has ideal balance of hardness, strength and impact resistance. Excellent for high production turning, facing and boring of all types of steel at mid-range feeds and speeds.

T-16 (tools) Tungsten-titanium carbide grade. For high speeds, light feeds on finishing of harder steels. Hard, wear resistant. Exceptional heat and crater resistance. RA 91.5.

T-31 (tools) Tungsten-titanium carbide grade. For light feeds on finishing of heat treated steel. Ideal for precision boring, facing and turning on light uninterrupted cuts. Hardest and most wear resistant steel cutting grade. RA 92.

WF (tools) A new cermet cutting material containing neither tungsten nor cobalt, but using nickel as a binder. Used for ultra high speed machining in the finishing range of classification on steel.

H-6 (dies) Straight tungsten carbide grade. Very hard grade, for nonferrous drawing applications where high wear resistance is essential. RA 91.

H-8 (dies) Straight tungsten carbide grade. Medium hard, good wear resistant grade, particularly adapted to steel drawing or nonferrous drawing where greater strength than H-6 is required. RA 90.

H-13 (dies) Straight tungsten carbide grade. Best general purpose wire, tube or bar drawing grade. For steel drawing applications requiring greater strength than H-8. Ideally suited for deep drawing of sheet or large bar and tube dies. Also suitable for extrusion applications requiring a relatively hard material. RA 88.

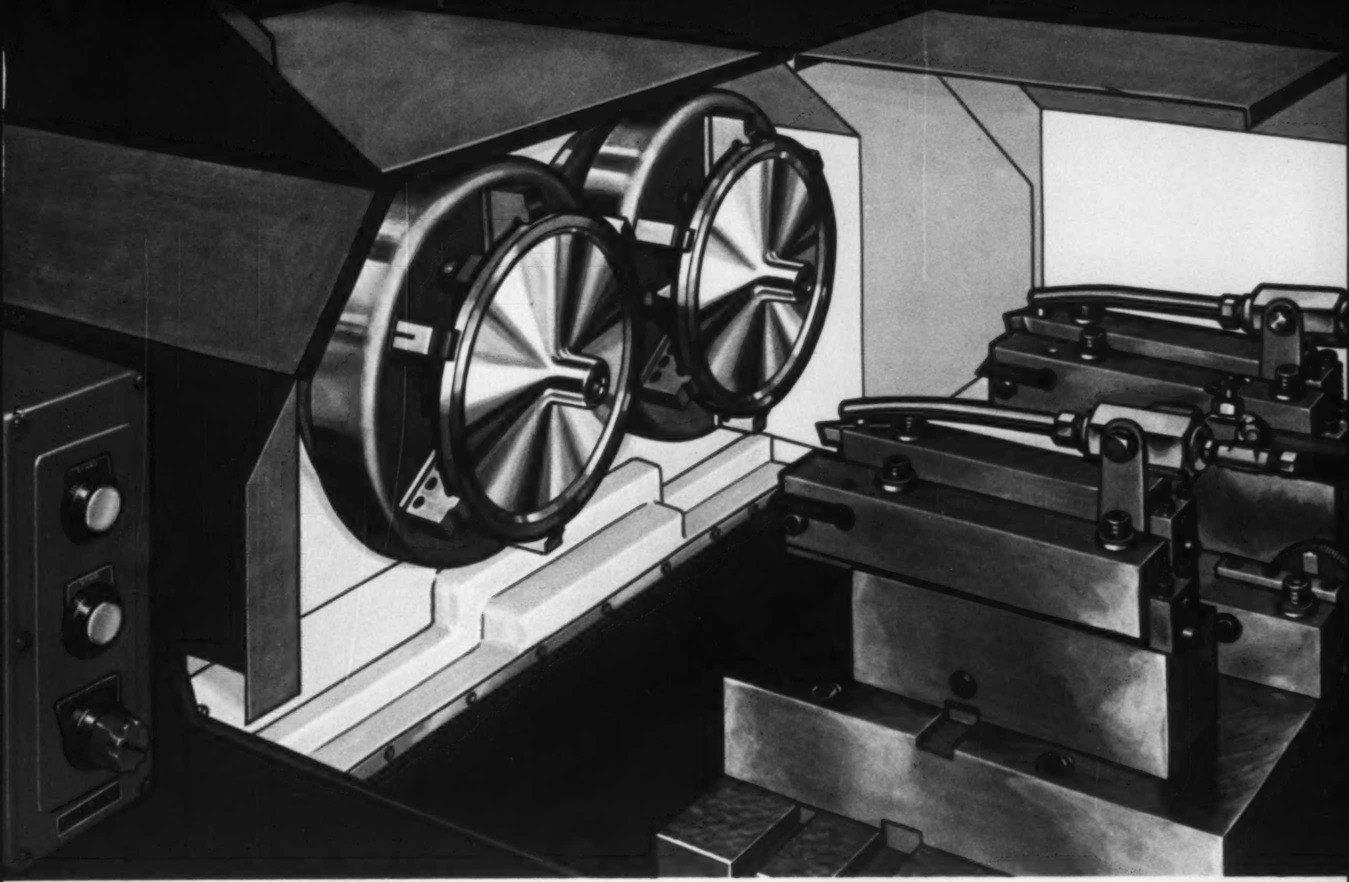
ND-20 (heading applications) Tungsten-tantalum carbide grade. Medium soft, with high impact resistance for more difficult extrusion applications or cold heading applications not over 0.100-in. diameter. RA 96.

ND-25 (extreme heading applications) Tungsten tantalum carbide grade. Ideal for most cold heading applications. Impact resistance. RA 84.

ND-30 (extremely difficult cold heading applications) Toughest cold heading grade. Used only on impact application when maximum strength is required. RA 81.

DCX (blanking applications) Straight tungsten carbide grade. Best "all purpose" blanking grade. Combines the greatest degree of toughness and

(*Continued on p.* 319)



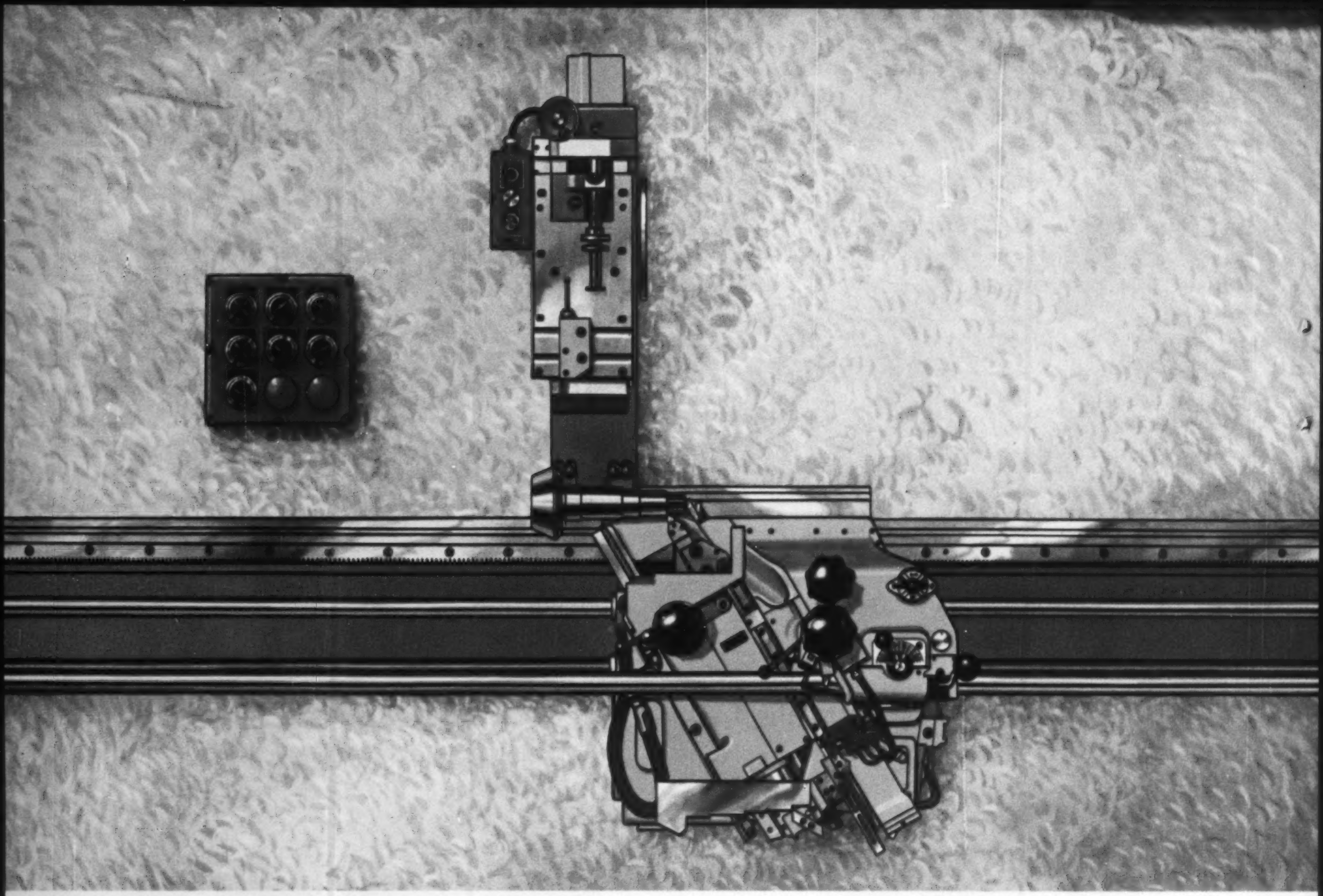
Consistent accuracy to tenths at super speeds

Model 37 Precision Boring Machine is a machine with a mission, rather than an answer to everybody's metal turning problems. Its mission is contour boring and turning in applications where both extreme repetitive accuracy and high production are of paramount importance. If you have such a requirement, Model 37 is an unbeatable money-maker.

It is an inherently simple machine: simple to operate, with inspection limited to gauging any one dimension. Simple in operating principle, too, built around precision cams that operate without being affected by temperature fluctuation. From one to four high speed spindles can be mounted on a single machine.

We would be happy to discuss *any* production problem involving straight or contour boring and turning. We doubt that anyone equals New Britain's know-how in this area, and we have a wide variety of boring equipment, both vertical and horizontal and of very advanced design. No matter what your work, or production requirements, this is a very fine place to look for an answer. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division · New Britain, Connecticut



Fast, rugged New Britain +GF+ copy lathes

Right from the ground up the New Britain **+GF+** is a machine conceived, designed and manufactured as a copying-contouring lathe. Not a standard lathe with copying attachment; not a factory-made "special" with the contouring feature built on components from other lathes; but a solidly based, ruggedly constructed, fast, powerful, accurate machine designed solely for the template-controlled, rapid production of between-centers or chucked work with external or internal contouring.

A million pieces or just a few, it's a machine you'll use on many different types of short-run jobs (just change the template and reset the controls), or on one long-run job (just replace the single-point tool when it wears).

The instantaneously accurate hydraulic copying mechanism is entirely enclosed within the compact carriage. All controls are within easy reach. The template is up front for easy adjustment. The chips fall free into the wide open base, can't clog or jam any part of the mechanism.

There are endless variations available within the New Britain **+GF+** line. The standard model has applications anywhere on between-centers or chucked pieces. Other attachments and models are available to suit your particular requirements; infeed attachments, automatic loading, bar stock models, etc.

Don't buy any lathe or "special" for copy turning until you have investigated the New Britain **+GF+** copy turning lathe. As a starter, may we send you the latest catalog?

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division - New Britain, Connecticut

wear resistance. For most lamination punches and dies. RA 88.

MPD-2 (mining applications) Straight WC grade. Best shock resistant percussion rock bit grade. Ideal for undercutter machine bits for heavy duty continuous mining equipment in coal. RA 88.5.

MPD-10 (mining applications) Straight tungsten carbide grade — most wear resistant grade which will withstand medium heavy impact of the mining percussion grades. Highly recommended for the rotary mining applications. RA 90.

Metallurgical Products Dept.
General Electric Co.
Carboloy Brands

44A (tools and dies) General purpose machining. Best grade with which to start when user is not experienced in machining with carbides. Medium high shock resistant, medium low wear resistant. Used in small standard wire dies. Contains WC and Co.

55A (tools and dies) Heavy duty, interrupted cuts. Used for machining steel and cast iron parts and in bar and tube drawing dies, tube drawing mandrels, shell dies and percussion tools. High shock resistant, low wear resistant. Contains WC and Co.

55B (dies) For large draw dies and blanking and piercing operations. Contains WC and Co.

78 (tools) For finishing and light roughing steel. Adaptable for practically all types of steel. Medium shock resistant, high wear resistance. Contains WC, Co, TaC, and TiC.

78B (tools) General purpose steel machining. Recommended as the best grade with which to start when the user is not experienced in machining steel with carbides. Used to some extent on Monel and nickel steels. Medium high shock resistant, medium wear resistant. Contains WC, Co and TiC.

120 (tools) Rotary type tools. Contains WC and Co.

190 (dies) Cold heading operations for rivets, bolts, screws, etc. Most ductile grade and is highly resistant to shock. Toughest available die material. Contains WC and Co.

330 (tools) For precision finishing and boring steels. Contains TiC, TaC, WC and Ni.

350 (tools) For light roughing and finishing steels. Contains WC, TiC, TaC and Co.

370 (tools) For heavy duty interrupted cuts and general machining of steel, including roughing. Contains WC, TiC, TaC and Co.

608 Mechanical applications, corrosion and heat resistant. Low density, non-magnetic. Contains Cr_3C_2, Ni and W.

779 (dies) Good wear resistant properties. Used where strength is not a factor because of high hardness. Tendency toward brittleness. Contains WC and Co.

860 (tools) For milling high tensile cast irons. Contains Co, TaC, WC.

883 (tools) General machinery, close limits. Used for roughing, finishing and also for one cut finishing. Can also be used for light finishing cuts on steel. Medium shock resistant, medium wear resistant. Contains WC and Co.

905 (tools) Finishing and light roughing. Makes possible finishing cuts to close tolerances. Used for light finishing cuts on alloy cast iron with hardness up to 550 Brn. Medium low shock resistant, medium high wear resistant. Contains WC, Co, TaC.

907 Machining alloy cast irons. Contains WC, Co and TaC.

999 (tools and dies) precision finishing. Resists abrasion of centrifugally cast iron and alloy irons. Low shock resistant, high wear resistant. Used in precision finishing and in small wire dies. Contains WC and Co.

0-30 Cemented Oxide Ceramic type cutting tool for finishing steels at speeds up to 7500 fpm and higher.

Kennametal Inc.

KM Type A; 91.0 R_A; 11.90 density; 300,000 psi TR. Crater-resistant grade stronger than K3H but not as crater-resistant and not as hard. For continuous or interrupted roughing cuts on carbon and alloy steel forgings, bar stock, tubing, etc., of 0.30 C and above, free from sand or scale. High in $WTiC_2$ for resistance to pick-up or galling.

K3H Type A; 92.0 R_A; 11.10 density; 250,000 psi TR. Crater-resistant general purpose grade for moderate cuts on carbon and alloy steels of 0.30 C and above, also for medium to heavy cuts on soft steels with less carbon. Most suitable grade for new high surface speed tooling with mechanically-mounted cutting inserts, high in $WTiC_2$ for resistance to pick-up or galling.

K5H Type A; 93.0 R_A; 11.50 density; 200,000 psi TR. Crater-resistant grade harder and more crater-resistant than K3H, but not as strong. Available in solid tools and inserts for mechanical-mounting. For light cuts to precision finishing on clean steel. High in $WTiC_2$ content, for resistance to pick-up or galling.

K7H Type A; 93.5 R_A; 11.10 density; 150,000 psi TR. High hardness crater resistant grade designed for high velocity machining at light to moderate feed rates on alloy steels, alloy cast irons, high temperature alloys, and stainless steels. Its high strength and wear resistance make it desirable for a variety of applications, including interrupted cutting.

K165 Type A; 93.5 R_A; 5.6 density; 150,000 psi TR. A titanium carbide base cutting tool material designed for high velocity finish machining at light feed rates on alloy steels, most high temperature alloys, stainless steels, and alloy cast iron. Its high TiC content resists build-up and its high hardness provides excellent wear resistance, making it desirable for fine finish precision machining.

K21 Type B; 91.0 R_A; 12.65 density; 250,000 psi TR. The general purpose grade of this group. Provides maximum crater and edgewear resistance in combination with high strength. Particularly well suited for general roughing of steel castings and scaly forgings. Performs well in interrupted cutting with light chip load, as in steel milling. Highly resistant to thermal shock.

K2S Type B; 91.5 R_A; 12.90 density; 275,000 psi TR. Crater and edgewear resistant. Highly resistant to thermal deformation encountered in heavy roughing of cast and forged steels. Capable of long life in high surface speed operations on medium roughing operations where shock resistance due to interruptions is required.

K4H Type B; 92.0 R_A; 12.45 density; 250,000 psi TR. Crater and edgewear resistant grade harder than K2S but similar in characteristics. Resistant to thermal shock. Resists edgewear due to light chip load on steel, as in form tools, large nose radius or where tool must dwell at end of cut.

K1 Type C; 90.0 R_A; 14.10 density; 325,000 psi TR. Edgewear resistant grade. Stronger, more shock-resistant than K6 but not as wear resistant. For very heavy rough cuts on alloy or plain cast iron; as in planers, boring mills, large lathes, etc. Also used on steel where speeds are below desirable range and for heavy cuts on austenitic stainless steel. Extremely resistant to thermal shock. Particularly suited to heavy roughing of high strength-high temperature alloys.

K6 Type C; 92.0 R_A; 14.80 density; 250,000 psi TR. General purpose edgewear resistant grade in this group. For roughing to finishing cuts on cast iron and rough to medium cuts on non-ferrous alloys of copper, aluminum, magnesium and titanium, and on austenitic stainless steel. Also for reaming of steel. For general machining of high temperature alloys.

K8 Type C; 92.5 R_A; 15.10 density; 200,000 psi TR. Edgewear resistant, harder and more abrasion resistant than K6 but not as strong. For fine finishing of cast iron and light cuts on alloys of copper, aluminum, magnesium, titanium and non-metallics. Used for scrapers on both steel and cast iron. For finish machining of high temperature alloys. K8 is the most abrasion resistant of all the Kennametal grades.

K11 Type C; 93.0 R_A; 15.15 density; 175,000 psi TR. Most edgewear resistant of all Kennametal grades. Provides phenomenal life in fine finishing of non-ferrous metals, cast iron, and chilled iron. Ideally suited for machining plastics of various types. Also recommended for compacting ceramics and abrasive wheels or for any operation where severe abrasion is encountered, such as fine finish machining of high temperature alloys.

KE7 Type C; 91.5 R_A; 14.80 density; 250,000 psi TR. Special straight tungsten carbide, available only in slender extruded forms of various cross sections primarily for wear resistant applications.

K82 Type D; 90.0 R_A; 11.80 density; 275,000 psi TR. Large content of tungsten titanium carbide, $WTiC_2$ to resist "galling." For draw die sizes R-17 to R-19.

K84 Type D; 91.0 R_A; 11.90 density; 300,000 psi TR. Large content of $WTiC_2$. For draw die sizes from R-14 to R-16.

K86 Type D; 91.5 R_A; 11.10 density; 250,000 psi TR. Large content of $WTiC_2$. For draw dies sizes R-10 to R-12.

K90 Type E; 85.0 R_A; 12.90 density; 360,000 psi TR. Tungsten carbide, WC, 25 pct. cobalt. For heavy blanking punches and dies, cold-heading dies, nail gripper dies, nibbling dies and other severe shock applications.

K91 Type E; 86.5 R_A; 13.41 density; 380,000 psi TR. Tungsten carbide WC, 20 pct. cobalt. Medium soft grade in high impact group. More wear resistant than K90, and used for less severe shock applications, as crushing hammers, rivet sets, etc.

K92 Type E; 87.5 R_A; 13.81 density; 385,000 psi TR. Tungsten carbide, WC, 16 pct. cobalt. More wear resistant than K90 and K91 with less impact resistance. For lamination punches and dies, heavy forming dies, heavy heading machine hammers, etc.

K94 Type E; 90.0 R_A; 14.10 density; 325,000 psi TR. Tungsten carbide, WC, 12 pct. cobalt. For light impact work, such as blanking of 0.020 in. steel stock. Also applicable to swaging and rivet heading of non-ferrous metals.

K95 Type E; 90.5 R_A; 14.60 density; 300,000 psi TR. Tungsten carbide, WC, 9 pct. Cobalt. Combines excellent wear resistance with some impact resistance. For blanking of very light ferrous and nonferrous materials, and for light heading hammers.

K96 Type E; 92.0 R_A; 14.80 density; 250,000 psi TR. Tungsten carbide, WC, 6 pct. cobalt. For very light blanking work, 0.010 in. stock or under, particularly in non-ferrous materials, and other applications where simple, sturdy sections requiring great rigidity, and compressive strength, and high wear resistance are needed. Used where shock resistance is not a big factor.

Kentanium Essential ingredient titanium carbide, small percentage of other refractory carbides, such as Cb, with nickel binder. For high temperature applications beyond the range of conventional metal-cutting carbides 1800° to 3000° F available in several grades, shapes and forms.

Metal Carbides Corp.

101 For drawing of small gage nonferrous wire and liners for sand blast nozzles. R_A 93.5.

C-93 For precision boring and finish turning of cast iron, nonferrous metals and non-metallic materials. Drawing of nonferrous round bar stocks and tubing. R_A 92.5.

C-91 For general purpose machining of cast iron and nonferrous metals. Drawing of nonferrous shape bars and lighter draws on steel bars and tubing. R_A 91.5.

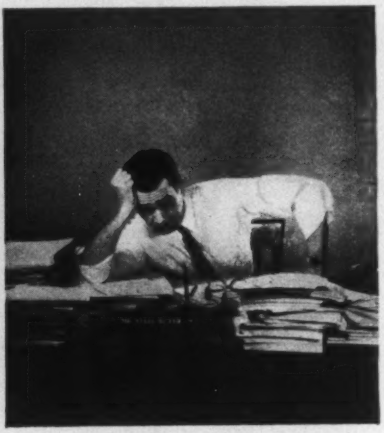
C-89 For heavy duty roughing and interrupted cuts on cast iron and nonferrous metals. General purpose drawing of steel wire, tubing, bars and shapes. Tipping wear areas on gages, bushings, centers, guides and powder metallurgy dies. R_A 90.5.

S-88 For heavy hogging and rough machining of all kinds of steels including cast, forged, rolled, alloy and heat treated. R_A 90.0.

S-90 For universal, all-purpose, machining of steels including Monel metal and nickel steels. R_A 91.0.

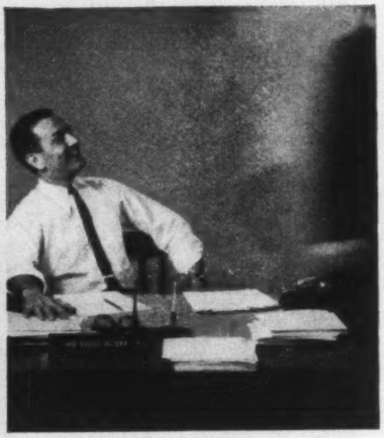
S-92 For light, high speed precision

NEW
TOOL STEEL
SERVICE
simplifies purchasing
(and
saves money,
too)



Buying assorted brands of tool steel creates costly paperwork for your...

you buy fewer grades of tool steels to do more jobs...eliminate piles of paperwork



carry fewer pounds in stock (reduce chances of inventory "mix-ups"), and...

Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Caldwell, N. J. • Charlotte Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton • Denver • Detroit Erie, Pa. • Grand Rapids • Houston • Indianapolis • Los Angeles • Miami • Milwaukee New Haven • New York • Philadelphia • Pittsburgh • Portland, Ore. • Providence • Rockford Salt Lake City • San Francisco • Seattle • Springfield, Mass. • St. Louis • E. Syracuse Tampa • Toledo • Tulsa • CRUCIBLE STEEL OF CANADA, LTD., SOREL, QUEBEC, CANADA

For more data circle No. 180 on postcard, p. 213

boring and fine finishing of steels at high speeds. Ra 92.0.

C-88 For light extrusion and swaging operations under average conditions. Tipping wear areas on tube drawing mandrels, centerless grinder blades, core rods and draw punches. Ra 89.0.

C-85 For heavier and more severe extrusion and swaging operations. Lighter cold heading and hammering applications in the bolt industry Ra 87.5.

C-80 For general purpose use in cold heading dies, heading hammers, cut-off quills, shearing knives and lamination punch, die inserts. Ra 86.0.

C-75 For heavy duty and extra severe cold heading, shearing and metal forming operations. Punch and die inserts for performing and slotting heavy gage sheetmetal. Ra 84.0.

A. Milne & Co., Inc.

Ferro Tic "C" A machineable, heat treatable carbide for applications requiring great wear resistance for general purpose tool and die work. It is used for blanking, bearings, rolling, compacting, drawing, cold heading, spinning and crimping dies. It is used for wear parts such as bearings, guides, gauges, work rests, nozzles, valves and fixtures. It is also used for cutting tools on ceramics, plastics, wood and all non-metallics where heat generated is low.

Ferro Tic "J" A new material for high production cutting applications particularly on circular formed tools.

Newcomer Products, Inc.

NS-15 For precision finishing, particularly on tough steel alloys. Highly resistant to shock and edge wear. Ra 93.0.

NS-2 A general purpose carbide for roughing and average finishing. It is crater resistant, has high edge strength. Ra 92.0.

NS-3 For roughing, milling and general machining of steel. Takes considerable shock and is abrasion resistant. Transverse rupture break strength, 275,000 PSI. Ra 91.2.

NS-4 Similar to NS-3 but with transverse strength of 300,000 PSI Ra 91.3.

NS-65 For heavy roughing at slow speeds with heavy feeds. Good for heavy interrupted cuts. Ra 91.0.

NC-2 A precision finishing carbide. highly abrasion resistant with general purpose on non-metallics. Has high speed finishing of Aluminum-Bronze-Cast Iron and lighter Alloys. Ra 93.0.

NC-3 A general purpose carbide. Used for roughing and finishing cast iron, and heavy roughing on non-metallics. High edge strength and abrasion resistance. Excellent for Milling Cast iron. Ra 92.1.

NC-4 For roughing with high strength for interrupted cuts. Has extra hardness—heavy feeds. Ra 91.2.

NC-5 For heavy roughing at slow speeds with heavy feeds. Used on large Boring Mills and Planers. Ra 89.3.

NewMet, Grade NM-95—A high velocity metallic cutting material. Easy to obtain fine finishes from conventional speeds of carbides to high velocities of ceramics. Reluctant to absorb or transfer heat. Transverse rupture break strength, 140,000 PSI. RA 95.

NewPro, Grade NS-35—A general purpose economy priced carbide for roughing, average finishing, milling and general machining of steel. Transverse rupture strength, 225,000/250,000 PSI. RA 91.6.

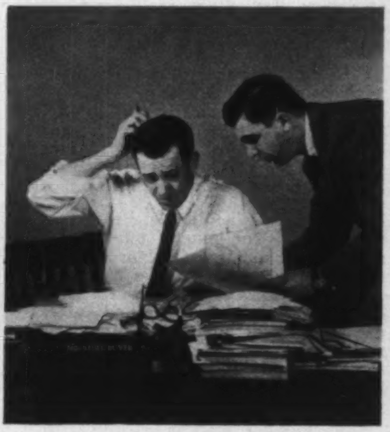
NewPro, Grade C-35—A general purpose economy priced carbide. Used for roughing and finishing cast iron and non-ferrous materials. Excellent milling grade. Transverse rupture strength, 225,000/250,000 PSI. RA 91.5.

Sandvik Steel, Inc.
Coromant

F1 Precision machining of steel. Most crater resistant grade. Used for finish-machining of steel to close tolerances and a smooth surface finish.

CRUCIBLE
MR. STEEL BUYER

purchasing and receiving departments — manufacturing and accounting, too.



With Crucible's new Tool Steel Service you cut these costs substantially because

pay a lower price per pound (by eliminating costs for small quantity "extras").

For the
full story,
call in a
CRUCIBLE
Service Engineer.

CRUCIBLE STEEL COMPANY OF AMERICA

For more data circle No. 180 on postcard, p. 213

H20 Machining of cast iron, light alloys, etc. Very high resistance to abrasion. Good toughness. Used for finishing and roughing cast iron, copper-alloys, and light alloys. Suitable also for drills, reamers and wear resistant parts.

H13 Finishing and roughing of cast iron. A particularly wear-resistant grade for machining of hard cast iron, very abrasive metals, plastics, etc. Tough enough to be used in ordinary milling. For extreme finishing, where very high wear-resistance is wanted, our special grade H5 is recommended.

S1P When very high wear-resistance is wanted use S1P. S1P is tougher but less wear resistant than F1.

S2 General purpose machining of steel. Good wear resistance and toughness. For finishing and roughing under less favorable working conditions. S2 is tougher but less wear resistant than S1P.

S4 Rough machining of steel. High toughness and good wear resistance. Used foremost for machining under bad working conditions, interrupted cuts, etc. S4 is tougher but less wear resistant than S2.

S6 (Extra) Rough machining of steel. The toughest of all the Sandvik Coromant grades of steel. Used for really tough applications and materials, e.g. shaping, interrupted cuts, feeds over 1/32", for cast steel, austenitic steels, heat resisting and stainless steels, scaly materials.

Sintercast Division Chromalloy Corp.

SF-1 For heavy duty roughing and interrupted cuts on cast iron and nonferrous metals.

SF-2 For general purpose machining of cast iron, nonferrous metals, and all non-metallic materials. Excellent wear resistance to abrasive substances.

SF-3 Similar to SF-2 although harder and more wear resistant. Used for light finishing work where shock is limited.

SF-4 For precision boring and finishing of cast iron, nonferrous metals and non-metallic materials. Has highest resistance to abrasion in applications where shock is negligible.

SF-5 For rough machining and hogging of all steels.

SF-6 For general purpose machining of all steels including special alloys.

SF-7 For light machining of all steels including stainless.

SF-8 For high speed precision boring of all steels.

SF-9 For drawing of all types of wires, tubes or bars; for special wear parts, guides, rests, bushings; for powder metallurgy dies. This material is very hard and highly wear resistant for applications where shock is not encountered.

SF-10 For drawing larger size tubes and bars, and for wear parts requiring more shock resistance than provided by SF-9.

SF-11 For drawing extra large tubes and bars for mandrels, light extrusion, and wear resistant parts subjected to medium shock.

SF-12 For heavy extrusion and light swaging; for light cold heading, blanking and piercing operations where impact strength is required.

SF-13 For General purpose heading applications, for swaging, blanking and all heavy impact operations.

SF-14 For the most severe impact applications such as punching, perforating and heavy cold heading.

Ferro-Tic C—Machinable, heat treatable, carbide for general purpose tool and die work. Used for blanking and piercing dies, cold heading dies, deep drawing dies, gages, arbors shear knives, drawing mandrels and cutters for plastics, ceramics and other nonmetallics. Wear resistance and impact strength can be adjusted by variations in the heat treating procedures.

Tungsten Alloy Mfg. Co.

9B (tools) Hardest of all the straight carbide grades. For fine precision boring and fine finish machining of cast iron, nonferrous metals and non-metallic materials, using light steady cuts at high speeds and fine feeds. Will produce close tolerance finishing where cut is light and machine set-up is rigid. For very small dies for drawing nonferrous and coated ferrous wire. For wear parts where no shock or impact are encountered. This grade is extremely resistant to abrasion and corrosion but has low resistance to shock. RA 93.0.

9C (tools) For precision boring and fine finish machining, also milling, cast iron, nonferrous metals and nonmetallic materials. Will produce close tolerance finishing where the cut is slightly heavier and the machine set-up is less rigid than under similar conditions when using 9B. For wear parts where no shock or impact are encountered. Has poor resistance to shock but superior resistance to abrasion. RA 92.5.

9H (tools) Versatile cutting grade for precision and finish machining of practically all nonferrous metals and non-metallic materials. For solid carbide burrs, drills, reamers and end-mills for machining both nonferrous metals and steels, especially austenitic steels, where edge wear is the only problem and no cratering is encountered. Also applied on small wire and tube drawing applications and wear parts where only light shock is encountered. Has fair resistance to shock and very good resistance to abrasion. RA 92.0.

9 (tools) General purpose grade for rough machining and interrupted cutting of cast iron, nonferrous metals and non-metallic materials. Excellent for all nonferrous wire drawing, small steel wire drawing, light blanking and wear parts where only light to medium shock is present. Good resistance to shock and abrasion. RA 91.5.

16G (tools) A premium grade developed primarily for hot working and cutting hot flash steel weld. Can also be used with good results for some wear applications where severe galling is encountered. RA 86.5.

12H (tools) A premium grade developed for planing, shaping and other applications on steel where other grades fail due to shock. A tough grade for use at medium speeds but over a wide feed range. RA 89.5.

11T (tools) Developed as a steel cutting grade for heavy duty machining and interrupted cutting. Will take shock, cut scale, and withstand variations of depth-of-cut normally encountered in roughing steel castings and forgings, RA 90.5.

9S Developed as a premium steel cutting grade for roughing and general purpose heavy machining. Range of use extends from roughing to semi-finishing applications. RA 91.5.

10T (tools) Developed as a steel cutting grade for general purpose machining. Range of use extends from light roughing to finishing. Excellent for milling and form tool work, reamer blades, etc. RA 91.0.

9T (tools) Developed as a steel cutting grade for finish machining. Range of use extends from light roughing to light finishing. RA 91.5.

8T (tools) Developed as a steel cutting grade for semi-finishing. Range of use extends from light roughing to semi-finishing. May be applied on any applications where little shock is involved and the cut is uniform and relatively light. RA 92.0.

5S (tools) Developed as a premium steel cutting grade for fine finishing and precision boring. A high speed finishing grade combining excellent wear resistance with satisfactory toughness. RA 92.5.

9M (dies) Can also be used for extra rough machining of cast iron, alloy and chill castings and nonferrous metals. Excellent for case and deep draw applications; light cupping; medium wire, rod and tube drawing; light bolt extruding; tube draw mandrels, both steel and nonferrous metals where shock is only medium and impact is light. RA 90.5.

9A (dies) A multi-purpose grade for a variety of die applications such as powder metal compacting; heavy case and deep drawing; heavy wire, rod and tube drawing; medium bolt extruding; heavy draw mandrels and other applications where shock is only medium and impact is light. Also used for quills, cut-off knives and blanking dies. Good resistance to medium shock. RA 89.5.

11C (dies) Developed originally as a special precussion grade for rock bit applications but can be used as an intermediate grade between 9A and 9A15 and replaces either in many instances; tougher than 9A; more resistant to abrasion than 9A15. RA 89.0.

9A15 (dies) Multi-purpose grade for light blanking, spring coiling, mandrels, heavy bolt extruding, lamination blanking, large tube draw mandrels, small nail grippers, and other applications where medium to heavy shock and medium impact are encountered. Good resistance to medium and heavy shock. This is also the standard hot-press grade. RA 88.5.

15C (dies) Special die grade, between Grade 9A15 and Grade 9A20; replaces either in many instances; tougher than Grade 9A15; more resistant to abrasion than Grade 9A20. RA 87.0.

9A20 Multi-purpose grade for dies; silicon steel lamination blanking; heavy coiling mandrels; large nail grippers; heavy bolt sizing; cold heading hammers; small swaging and other applications where heavy shock and medium impact are encountered. Good resistance to heavy shock. RA 86.5.

9A25 (dies) Rugged, multi-purpose grade for dies and where heavy shock and heavy impact are encountered. Good resistance to very heavy shock. Not recommended for metal cutting or cold heading. RA 84.5.

9A30 (dies) Toughest of all straight tungsten carbide grades. A special grade for dies where extra heavy shock and extra heavy impact are encountered. Good resistance to extreme heavy shock. Not recommended for metal cutting or cold heading. RA 82.5.

20H For cold heading where galling and seizing are factors and where heavy shock and impact are encountered. Recommended for sizes up to approx. 0.100 in. body diameter. RA 86.5.

25H For cold heading where galling and seizing are factors and where extra heavy shock and impact are encountered. Recommended for body diameters above 0.100 in. RA 84.5.

30H For cold heading where galling and seizing are factors and where extreme heavy shock and impact are encountered. For work where breakage rather than wear is encountered. RA 82.5.

Unimet Carbides

U-80 Specifically designed for high production boring of steel parts to close tolerances. Also recommended for precision turning, facing and chamfering where these operations are combined with boring. Brazing and welding require extreme care.

U-73 With this extremely tough grade greater feeds and speeds can be used for light roughing and general finishing cuts in steel. This grade will cut efficiently at extremely high temperatures.

U-53 For taking heavy roughing cuts in steel at increased rates of feeds and speeds and for interrupted roughing cuts. This grade is tough, shock resistant, has high resistance to abrasion. Will cut efficiently at extremely high temperatures.

U-70 Ideal for finishing large steel forgings and castings that have been rough machined. Also suited for combination roughing and finishing cuts on tubing and bar stock where shock is negligible. Can be used on small steel forgings and castings that are relatively clean where the cuts would be uniform and not too heavy. Brazing and grinding can be done in regular way.

U-60 Excellent for average and semi-finishing work on steel forgings and castings, also for withstanding shock as is often encountered in milling steel. Tougher than Grade U-70 but slightly less resistant to wear. Brazes and grinds easily.

U-40 For high production boring of aluminum or brass parts to close tolerances where light finishing cuts are to be made. Can also be used on cast iron and plastics. Complete setup (machine and fixtures) must be rigid to prevent vibration and shock. Brazing and grinding require care.

U-30 Generally used where more than average stock is removed with finishing cuts and machine conditions are not the best. Will withstand reasonable shock and has unusual edge strength. Widely used on coat iron alloy and aluminum. For brazing and grinding use regular methods.

U-20 This grade is adaptable to a wider range of work than is any other. It is used for machining cast iron, mild steels, aluminum, brass, plastics, ceramics, etc. Widely used in tipping scraper and wood working tools and forming tools for screw machines. Brazes and grinds easily.

U-10 For roughing cast iron. Designed for interrupted cuts on irregular castings. Also recommended for heavy cuts on aluminum or brass under relatively poor machine conditions. Good edge strength and shock resisting characteristics. Brazes and grinds easily.

U-110 For extremely heavy duty cutting. Excellent shock resisting properties make this grade ideal for use on stone chisels and coal mining bits and drills. Extensively used for tipping planer and jointer knives, striker knives and router bits for woodworking. Also for tipping rest blades on long thin centerless grinder work. Brazes, grinds easily.

Valenite Metals

VC-1 This grade is primarily for roughing cuts on cast iron. It is both tough and abrasion resistant. It will withstand the shock of interrupted cuts more than the other grades in its group. RA 90.8.

VC-2 A general purpose grade for a variety of machining on cast iron ranging from heavy to light cuts. It is also very useful for machining aluminum, brass, magnesium, titanium and non-metals. While less resistant to shock than VC-1, it is more wear resistant. RA 91.8.

VC-3 This grade is best applied to light finishing cuts on cast iron, nonferrous and non-metallic materials. Its shock resistance is low, but it is very hard and will withstand wear and abrasion well. RA 92.3.

VC-4 This is the hardest and least shock resistant of the wear resistant grades. It is best applied to precision boring and very fine light finish cuts where high surface finishes are desired. RA 92.8.

VC-6 This grade is used for lighter cuts than VC-5 where cratering is more of a problem. For general use on light and average cuts on steel, this grade will usually be found to be the best. RA 91.4.

VC-7 Combines crater and edge wear resistance to a high degree. While not as tough as the previous two grades, its higher hardness makes it adaptable to finishing cuts, on single point tools with a large nose radius, and in applications where the tool must dwell at the end of a cutting pass. It will also maintain size at the sides of a plunge cut. RA 92.

VC-8 This is the most wear resistant and hardest grade for use in machining of steels. It is best used in mechanically-held tools, solid boring tools, and where the machine is rigid and high machining speeds can be maintained. Where it is necessary to braze and grind VC-8, care must be exercised. RA 93.2.

VC-9 The best wear grade available where no shock is encountered. Excellent for use on machine parts where wear is a problem but no shock exists. RA 92.3.

VC-10 An excellent general-purpose wear grade. Will withstand light to average shock or impact and has excellent wearing properties. Used in gage blocks, ring gages, plug gages, and in die applications where the carbide is encased in steel. RA 90.8.

VC-11 Excellent for wear application where average to heavy impacts are encountered. Used in a variety of dies, mandrels, etc. Also has been used successfully in metal cutting applications such as in planer and shaper tools where impact is more of a factor than speed and wear. RA 89.5.

VC-12 A high strength carbide for use where shock is considerable, such as in blanking dies, lamination dies, punches, etc. RA 87.5.

VC-13 The use of this grade is confined to die and similar applications where heavy stock and impact conditions are met with. RA 87.

VC-14 Used for the heaviest of impact applications. However, it is abrasive enough to generally outwear other carbides designed for shock resistance. Used in heavy blanking dies, dies for solid heading, swaging, coining operations, nibbling cutters, etc. RA 85.5.

VC-125 A premium grade offered at standard prices. A combination of high tantalum, titanium, and cobalt contents enables VC-125 to stand the heavy shocks of interrupted cutting, slow speeds, heavy cuts, and poor machining surfaces. Will give outstanding performance on milling applications. RA 90.9.

Vascoloy-Ramet Corp

VR-87 (tools) For machining of hot weld flash from heavy steel pipe. Excellent shock resistance; moderate wear resistance with excellent resistance at cutting temperature. Contains WC, TaC and Co. RA 85.0.

AW (tools) Recommended for planing steel. Provides excellent shock resistance with fair wear resistance. Contains WC, TaC and Co. RA 89.7.

VR-77 (tools) For heavy roughing cutting on all types of steel including high-tensile strength and heat-resistant alloys. Combines good shock resistance, medium wear resistance and high resistance to cutting temperatures. Contains WC, TiC, TaC and Co. RA 91.0.

EE (tools) Recommended for heavy roughing and interrupted machining of all types of carbon and alloy steels. Very good shock resistance and medium wear resistance. Contains WC, TiC and Co. RA 90.8.

VR-75 (tools) Universal type grade for general purpose machining with a wide range of application. Designed for cutting all types of steel including high-tensile strength and heat-resistant alloys. Combines good shock resistance, good wear resistance and high resistance to cutting temperatures. Contains WC, TiC, TaC and Co. RA 91.3.

EM (tools) For general purpose machining of all types of carbon and alloy steels. Good shock resistance and good wear resistance. Contains WC, TiC and Co. RA 91.2.

VR-73 (tools) For light roughing and finish machining of all types of steel including high-tensile and heat-resistant alloys and for nodular and malleable iron. Fair shock resistance and very good wear resistance with high resistance to cutting temperatures. Contains WC, TiC, TaC and Co. RA 92.0.

E (tools) For medium and light machining of all types of carbon and alloy steels. Fair shock resistance with very good wear resistance. Contains WC, TiC and Co. RA 91.8.

EH (tools) For high speed and light finish machining and precision boring of all types of carbon and alloy steels. Contains WC, TiC and Co. RA 92.5.

VR-65 (tools) For high speed fine finishing and boring from 600 to 1500 SFPM on all types of carbon and alloy steel. Excellent wear resistance and moderate shock resistance. Contains TiC, Ni and other alloying carbides. RA 92.1.

2A3 (tools and dies) Heavy interrupted cuts and heavy machining at low speeds and heavy feeds. For machining cast iron, non-ferrous metals and non-metallics. Excellent shock resistance; moderate wear resistance. Used also in bar and tube drawing dies. Contains WC and Co. RA 89.3.

VR-54 (tools) Recommended especially for milling, broaching, hobbing, and rotary burring cast iron, non-ferrous metals and non-metallics. Combines very good shock resistance with good wear resistance. Contains WC and Co. RA 91.8.

2A68 (tools and dies) For roughing and interrupted machining of cast iron, non-ferrous metals and non-metallics. Good shock resistance with good wear resistance. Also used in small wire drawing dies. Contains WC and Co. RA 91.0.

2A5 (tools) General purpose grade for machining of cast iron, non-ferrous metals and non-metallics and of heat treated steel. Fair shock resistance; very good wear resistance. Contains WC and Co. RA 91.8.

2A7 (tools) For light high speed finish machining and precision boring of cast iron, non-ferrous metals, and non-metallics. Low shock resistance and excellent wear resistance. RA 92.2.

2A6 (dies) Used for larger wire drawing dies. Very good shock resistance, fair wear resistance. Contains WC and Co. RA 90.0.

AX (dies) Used for moderately heavy cold heading applications. Low wear resistance with high impact resistance. Contains WC and Co. RA 86.0.

AY (dies) Very heavy cold heading applications. Low wear resistance; highest impact resistance. Contains WC and Co. RA 84.5.

Wendt-Sonis

CQ-2 General purpose grade for cast iron and nonferrous materials, having high strength and hardness with high resistance to abrasive wear. Grade most suited for 90% of non-steel cutting applications. Density 14.9; RA 91.9; Transverse Rupture psi 250,000.

CQ-12 More shock resistant than CQ-2, while permitting it to withstand heavy intermittent roughing cuts on cast iron and nonferrous materials. Density 14.8; RA 91.2; Transverse Rupture psi 260,000.

CQ-3 More resistant to abrasion than CQ-2, this grade is designed for high production and long wear on finishing operations on boring, facing and turning. Density 14.95; RA 92.5; Transverse Rupture psi 210,000.

CQ-4 Hardest of the straight tungsten grades. Designed to provide optimum resistance to abrasion. For use where unusual conditions of wear resistance are required. Density 15.0; RA 92.7; Transverse Rupture psi 195,000.

CY-5 Designed for general purpose steel machining applications; combines high hardness with high strength for balanced wear resistance with strength. Density 11.6; RA 91.2; Transverse Rupture psi 225,000.

CY-16 A premium grade which will exceed the standard CY-5 grade in performance, due to additional processes in manufacture and control. Density 12.4; RA 91.7; Transverse Rupture psi 225,000.

CY-4 Strongest grade of the combined tungsten and titanium carbide combinations for very heavy interrupted cuts on steel or cast iron under low speed machining conditions. Density 13.3; RA 90.2; Transverse Rupture psi 290,000.

CY-2 Recommended for medium and light machining of steel and steel alloys. Principal applications are semi-finishing and finishing operations. Not as shock resistant as CY-16 or CY-5. Density 11.8; RA 92.4; Transverse Rupture psi 212,000.

CY-12 Recommended for heavy intermittent cuts in the machining of tough steel or steel alloy materials. Highly shock resistant. Density 13.2; RA 90.5; Transverse Rupture psi 280,000.

CY-15 More shock resistant than grade CY-16, while yet maintaining most of its crater resistance and wear resistance. Density 12.0; RA 91.5; Transverse Rupture psi 230,000.

CY-21 Hardest of the steel cutting combined carbide grades. Designed for finishing and boring applications on steel and for light high speed finish turning. Density 11.8; RA 93.5; Transverse Rupture psi 160,000.

Wesson Co.

GI is the general purpose grade for machining of cast iron, non-ferrous materials, abrasive material, like porcelain, and plastic—an unusual combination of high strength and hardness.

GA is a harder grade than GI and is applicable to machining of cast iron and non-ferrous metals—for finishing cuts in boring, facing, and turning.

GF grade has a maximum resistance to wear and is for only very light fast finishing applications on cast iron and non-ferrous materials — harder than GA, but not as strong as GA.

GS grade is recommended for "shock" applications. Especially well adapted to heavy boring mill operations. Because of its higher strength and lower hardness, it will withstand heavy intermittent and roughing cuts.

M The strongest grade for heavy or interrupted cuts on both steel and cast iron where the speed of the machine opproaches the low limit for carbides. Most adaptable grade where ease of grinding is a requirement.

WH Lighter and faster machining of all steels. Not as strong as Grade

WM, but has higher resistance to wear.

WM A medium grade for general machining of all types of steel. Its resistance to wear makes it the general-purpose steel grade.

WS A very rough, shock resisting grade for heavy or intermittent cuts, generally operated with heavy feeds and slower speeds. Tough steel cutting grade.

Willey's Carbide Tool Co.

6A For semi roughing and finishing. A premium quality grade combining superior wear resistance, crater resistance and sufficient toughness at high cutting temperatures. Exceptional perfomance at high feeds and speeds.

8-A Heavy duty roughing. A premium quality grade with exceptional toughness, shock resistance and wearing quality. Will resist high temperatures encountered in heavy duty machining and interrupted cuts.

509-4A For precision turning and boring and high speed finishing cuts to close tolerances. Has higher wear resistance than 606.

603 For light roughing and finishing. High abrasion resistance plus sufficient toughness for finishing practically all types of steel.

710 For general purpose machining. A tough, wear resistant grade that handles most types of steel, including Monel Metal and Nickel steels.

945-10A For machining steel on heavy duty machines. Has less wear resistance than other grades, but is tougher, with high shock resistance making it excellent for interrupted cuts.

E-3 For precision finishing operations, including the finishing of centrifugal cast iron and alloy irons. Has very high wear resistance.

E-5 The ideal grade for finish turning and boring. Keeps a good cutting edge, for finishing long runs at close tolerances. Handles light cuts on alloy cast iron up to 550 Bhn.

E6-X3 An all-purpose grade for roughing and semi-finishing. Has excellent wear resistance, plus toughness. Less shock resistance than E-8.

E-8 Ideal for heavy, interrupted cuts and all types of machining. Tougher than E-6, but slightly less resistant to wear.

E-13 For heavy cuts with slow speeds and heavy feeds. Very tough, and shock resistant. Used principally for wear surfaces.

E-18 A medium impact carbide for header and extrusion dies.

E-25 For heavy impact in blanking and forming dies.

Tool Steel Directory | Section 5—Producers and Distributors

Below are home offices of the producers and distributors referred to in this directory.

It includes only those who produce tool steels and carbides and those who sell under their own brand names.

Achorn Steel Co., 109 Smith Place, Cambridge 38, Mass.
Ackerlind Steel Co., Inc., 392 W. Broadway, New York 12, N. Y.
Adamas Carbide Corp., Kenilworth, N. J.
Agawam Tool Co., 77 Napier Street, Springfield, Mass.
Allegheny-Ludlum Steel Corp., Pittsburgh 22, Pa., Carbides, Ferndale, Detroit 20, Mich.
Allied Steel and Chemical Co., 605 West 43rd Street, New York 18, N. Y.
Armstrong Bros. Tool Co., 5209 W. Armstrong Avenue, Chicago 46, Ill.
Associated Steel Co., 4545 Hough Avenue, Cleveland 3, Ohio
Atlantic Steel Corp.: 1775 Broadway, New York 19
Atlas Steels, Ltd., Welland, Ontario, Canada

Baldwin Steel Co., 2225 St. Clair Avenue, Cleveland 14, Ohio
Bedford Tool & Forge Co., 22 Interstate Street, Bedford, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., 945 E. 67th Street, Cleveland 3, Ohio
H. Boker & Co., Inc., 101 Duane Street, New York 7, N. Y.
Boyd-Wagner Co., 1440 West Lake Street, Chicago 7, Ill.
Braeburn Alloy Steel Div., Continental Copper & Steel Industries, Inc., Braeburn, Pa.
Brown & Sharpe Mfg. Co., Providence 1, R. I.

Capewell Mfg. Co., Hartford, Conn.
Carpenter Steel Co., Reading, Pa.
The Champion Steel Co., 30520 Lakeland Boulevard, Willowick, Ohio
Columbia Tool Steel Co., Lincoln Highway and State Street, Chicago Heights, Ill.
Coulter Steel & Forge Co., 1494 67th Street, Emeryville, Calif.
Crucible Steel Co. of America, Oliver Bldg., Pittsburgh 30, Pa.

Darwin & Milner, Inc., 2222 Lakeside Ave., Cleveland 14, Ohio
Delaware Tool Steel Corp., Wilmington 99, Delaware
Diehl Steel Co., 236 Broadway, Cincinnati 2, Ohio
DoAll Company, 254 N. Laurel Avenue, Des Plaines, Ill.

Edgcomb Steel Co., 3600 No. "D" Street, Philadelphia 34, Pa.
Erie Steel Co., 403 Greenwich Street, New York 13, N. Y.

Fagersta Steels Pacific, Inc., 1011 E. 61st Street, Los Angeles 1, Calif.
Faitoute Iron & Steel Co., Inc., 182 Frelinghuysen Avenue, Newark 5, N. J.
A. Finkl & Sons Co., 2011 Southport Avenue, Chicago 14, Ill.
Firth-Loach Metals, Inc., P. O. Box 486, McKeesport, Pa.
Firth Sterling Inc., 3113 Forbes Ave., Pittsburgh 30, Pa.

Grayborn Steel Co., 122 E. 42nd Street, New York 17, N. Y.
Great Western Steel Co. name changed to Fagersta Steels Pacific, Inc., too late to correct directory listings. Great Western brands listed herein should read "Fagersta."

Hawkridge Bros. Co., 303 Congress Street, Boston 10, Mass.
Haynes Stellite Co., Div. of Union Carbide Corp., Kokomo, Ind.
Heppenstall Co., 4622 Hatfield Street, Pittsburgh 1, Pa.
Hidalgo Steel Co., Inc., 74 Varick Street, New York 13, N. Y.
Houghton & Richards, Inc., 19 Jersey Street, Boston 15, Mass.
Hoyland Steel Co., Inc., 405 Lexington Avenue, New York 17, N. Y.

Jamison Steel Corp., 13039 So. Main Street, Los Angeles 61, Calif.
Jessop Steel Co., 538 Green Street, Washington, Pa.

Kennametal, Inc., P. O. Box 231 Latrobe, Pa.
Kloster Steel Corp., 224 No. Justine St., Chicago 7, Ill.

Latrobe Steel Co., Latrobe, Pa.
Lehigh Steel Corp., Bethune and Greenwich Streets, New York 14, N. Y.
Ludlow Steel Corp., 5439 Perkins Rd., Bedford, Ohio

Marathon Specialty Steels, Inc., 375 Park Avenue, New York 22, N. Y.
Marshall Steel Co., P. O. Box 108, La Grange, Ill.
P. F. McDonald & Co., Boston 27, Mass.
Meridian Steel Co., Inc., 1776 Broadway, New York 19, N. Y.
Metal Carbides Corp., 107 E. Indianola Avenue, Youngstown 5, Ohio
Metallurgical Products Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
A. Milne & Co., 67 W. 44th Street, New York 36, N. Y.

Newcomer Products, Inc., Latrobe, Pa.
North American Steel Co., 4531 Hough Avenue, Cleveland 3, Ohio

Patriarche & Bell, 55 Carmine Street, New York 14, N. Y.
Peninsular Steel Co., 4401 Groesbeck Hwy, Detroit 5, Mich.
Pennsylvania Steel Corp., 12270 Coyle Avenue, Detroit 27, Mich.
Pittsburgh Tool Steel Wire Co., Division, Monaca, Pa.
Horace T. Potts Co., E. Erie Avenue and D Street, Philadelphia 34, Pa.
Pyramid Steel Co., 1812 E. 47th Street, Cleveland 3, Ohio

Republic Steel Corp., 1970 Carter Road, Cleveland 13, Ohio
Joseph T. Ryerson & Son Inc., 16th & Rockwell Streets, Chicago 80, Ill.

St. Lawrence Steel Corp., 18200 So. Miles Rd., Cleveland 28, Ohio
Sandvik Steel, Inc., 1702 Nevins Road, Fair Lawn, N. J.
Seaboard Steel Co. of America, Inc., 1775 Broadway, New York 19, N. Y.
Simonds Saw & Steel Co., Ohio Street, Lockport, N. Y.
Sintercast Division of Chromalloy Corporation, 134 Woodworth Avenue, Yonkers 2, N. Y.
L. S. Starrett Co., Athol, Mass.
Stulz Sickles Co., 929-939 Port Ave., Elizabeth, N. J
Swedish-American Steel Corp., 429 Kent Ave., Brooklyn 11, N. Y.

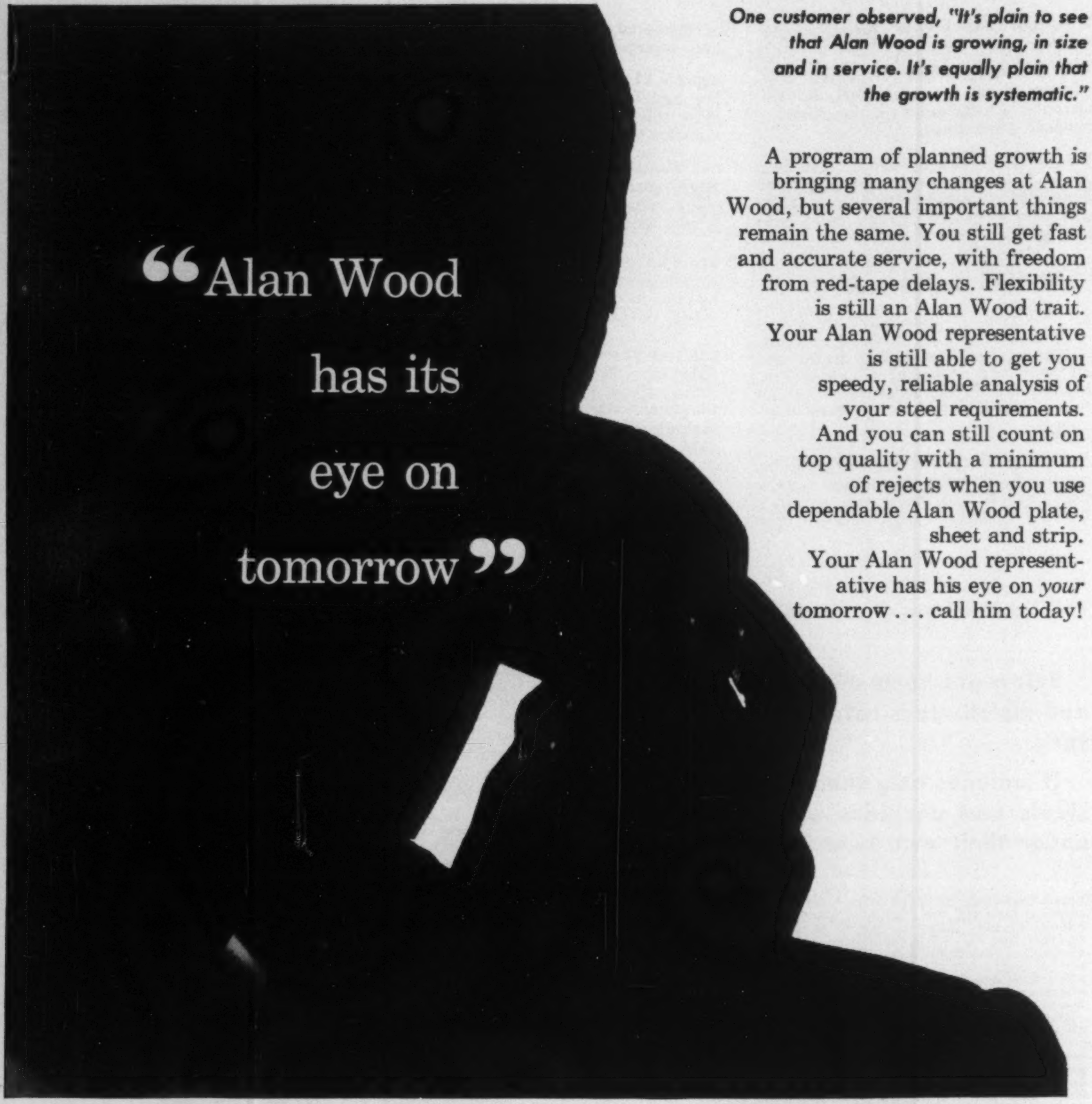
Timken Roller Bearing Co., Steel & Tube Div., Canton 6, Ohio
The Tool & Mfg Co., P. O. Box 10344, Pittsburgh 34, Pa.
Tungsten Alloy Mfg. Co., 65 Golden Street, Newark 3, N. J.

U. N. Alloy Steel Corp., 365 Dorchester Avenue, Boston, Mass.
Uddeholm Co. of America, Inc., 155 East 44th Street, New York 17, N. Y.
Unimet Carbides, Div of United-Greenfield Corp., 435 West Ontario Street, Chicago 10, Illinois
Universal-Cyclops Steel Co., Bridgeville, Pa., and Titusville, Pa.

Valenite Metals, Division of the Valeron Corp., Royal Oak, Michigan
Vanadium-Alloys Steel Co., Latrobe, Pa.
Vascoloy-Ramet Corp., 800 Market Street, Waukegan, Ill.
Vulcan-Kidd Steel Div., H. K. Porter Company Inc., Aliquippa, Pa.
Vulcan Steel Corporation, 2516 Sixth Avenue So., Birmingham 5, Alabama

Wendt-Sonis Co., 10th & Collier Sts., Hannibal, Mo.
Wesson Co., 1220 Woodward Hts. Blvd., Ferndale, Detroit 20, Mich.
Wheelock, Lovejoy & Co., Inc., 128 Sidney Street, Cambridge 39, Mass.
Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich.

Ziv Steel & Wire Co., 2945 W. Harrison Street, Chicago 12, Ill.



"Alan Wood has its eye on tomorrow"

One customer observed, "It's plain to see that Alan Wood is growing, in size and in service. It's equally plain that the growth is systematic."

A program of planned growth is bringing many changes at Alan Wood, but several important things remain the same. You still get fast and accurate service, with freedom from red-tape delays. Flexibility is still an Alan Wood trait. Your Alan Wood representative is still able to get you speedy, reliable analysis of your steel requirements. And you can still count on top quality with a minimum of rejects when you use dependable Alan Wood plate, sheet and strip. Your Alan Wood representative has his eye on *your* tomorrow . . . call him today!

ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • **STEEL PRODUCERS WITH THE CUSTOMER IN MIND**

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited

CS-9136
CS-913
CS-9136
CS-9136

The Iron Age Summary

Is the Market Ready to Move?

Outwardly, there is little change in the steel market. Orders hover around 50 pct of capacity.

But some new developments indicate a change in the market. October looks like the best month.

▪ New orders for steel are having trouble getting over the 50 pct of capacity rate.

The August improvement is less than expected and is far from encouraging to steelmakers. The best that can be said is that business has passed the low point.

Market Rumblings—But a number of new, though relatively minor, developments in the steel business indicate the market may be ready to move.

Here are some of the points noted in the market this week:

1. There has been a slight pickup in orders, although a small one. The gain has raised the order rate to something around 50 pct of capacity.

2. The order pickup is pretty much offset by the running out of old commitments. Backlogs are just about gone.

3. New orders are mostly for quick delivery. The volume of rush business is increasing. Eventually, it may reach the point where mills cannot fill all demands for fast dedelivery. However, mill inventories of semi-finished are heavy and the breaking point is not close.

4. Forward buying is very light. September orders of one mill are less than the same mill had 30 days ago. Mills do not expect forward booking to increase until the limits of rush delivery are reached.

5. Flat-rolled business is relatively good. For both July and August, one typical mill is shipping cold-rolled sheet at a rate equal to 60 to 70 pct of capacity. Galvanized is even stronger. Hot-rolled is down and tinplate is becoming a question mark.

Automotive Problems—Automakers' steel needs are up in the air. This contributes to added uncertainty about the size and depth of the expected auto upturn.

For one thing, manufacture of compacts will take up the greatest bulk of third quarter output. This includes model runouts of 1960's highly successful small cars. The first production runs of new 1961 lines, particularly General Motors products, are now taking place.

Some in the industry are convinced that this is one reason behind lower-than-expected steel orders from automakers. With four new compacts coming out, compounded by shorter styling of the "regulars," the changes in Detroit are getting more high level attention.

October Looks Best—Orders for steel for construction are just so-so. But a pickup in housing starts may give some new life to demand for appliances, which have been a big disappointment not only to appliance makers, but as a market for steel.

In spite of the uncertainties, October now looms as the biggest month of the second half for the steel industry. At that, operations may be expected to reach possibly 70 to 73 pct average for the month.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	1,556	1,537	1,476	335
Ingot Index				
(1947-1949=100)	96.9	95.7	91.9	20.9
Operating Rates				
North East Coast	59.0	58.0*	57.0	12.0†
Buffalo	56.0	56.0*	52.0	0.0†
Pittsburgh	50.0	49.0*	44.0	26.0†
Youngstown	47.0	47.0	35.0	10.0†
Cleveland	51.0	46.0*	46.0	0.0†
Detroit	80.0	78.0*	82.0	25.0†
Chicago	57.0	56.0*	58.0	5.0†
Cincinnati	58.0	55.0*	43.0	59.0†
St. Louis	58.0	54.0	52.0	82.0†
South	55.0	61.0	65.0	12.0†
West	46.0	48.0*	55.0	0.0†
U. S. Rate	54.6	53.9	51.8	11.8

*Revised †IRON AGE Estimate

Source: American Iron And Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$31.83	$31.83	$31.17	$39.83
No. 2 bundles	$21.50	$21.50	$21.17	$25.750
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	30.00
Lead, St, Louis	11.80	11.80	11.80	11.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	103.625	104.625	102.625	102.00
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Plentiful Supply Means Changes

United Engineering & Foundry Co., like many others, found that the change from tight to plentiful supplies meant adjustments.

Rush orders are now almost obsolete. Purchasers are writing rather than calling.

- Three years ago John Utzig was phoning suppliers and asking for the earliest possible shipment. Today, he is writing with instructions that orders should not be shipped before scheduled dates.

Mr. Utzig is director of purchases for United Engineering & Foundry Co. He has had to adjust a large, complex buying operation to the swing from tight to plentiful supply.

United Engineering is a leading builder of rolling mills and other equipment for basic metals plants. The company runs iron and steel foundries, machining and fabricating operations. Its sales have gone over $100 million in a single year.

Precision Purchasing—To a large extent, United builds equipment that is especially engineered and custom built. This demands a precision type of purchasing. Most supplies are bought to fill specific needs. Except for steel mill products and a few others, there is no inventory cushion to protect against late deliveries.

At the same time, purchasing must avoid deliveries that are too early. The high value of components and materials make the cost of holding stock a heavy one. As a further complication, the manufacturing cycle on heavy mill equipment averages 10 to 12 months. Buyers must maintain tight control over schedules that extend months ahead.

Standards and Checks—In balancing these needs, Mr. Utzig's purchasing department relies on a system of standards and checks. For castings, forgings and other rough materials, United requires delivery five to six months before the piece is due on the assembly floor. Ordinarily, no restrictions are placed on early shipment of these items.

Finished components must be delivered two to three months before they are due for assembly. Vendors may not ship finished parts before scheduled dates.

These general rules are backed by purchasing experience. Where the performance of a supplier has been unreliable in the past, Mr. Utzig's department polices orders with special care. The first sign of a delay brings a crackdown by expediters.

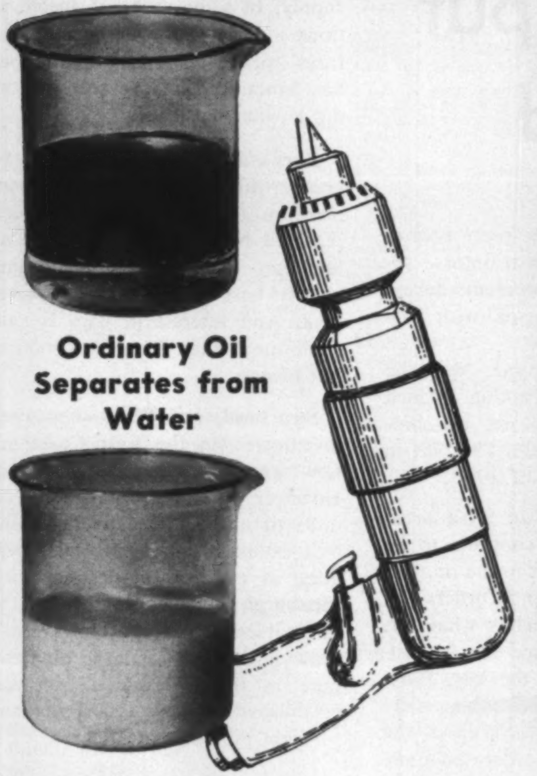
Controlled Deliveries — Under present conditions, the emphasis in United purchasing is on controlling deliveries to meet requirements rather than speeding them. Frequently, the company stipulates delivery at a date later than that offered by a supplier. In 1957, buyers were taking steel anytime they could get it and were placing orders by phone to avoid the risk of losing a batch because of the delay in processing papers.

Cost Studies—An awareness of costs likewise enters into United's approach to negotiating contracts. From its own manufacturing operations, the company has available cost information for a wide range of jobs. It uses this information as a standard in judging bids.

Regarding the outlook for industrial supply, Mr. Utzig sees no prospect of any tightening in the near future. He calls present price levels steady and satisfactory from the purchasing standpoint.

JOHN UTZIG: A precise purchasing agent.

NON-FLUID OIL BEST FOR AIR TOOL UPKEEP



NON-FLUID OIL
TRADE MARK REGISTERED

emulsifies with water

The "NR" grades of NON-FLUID OIL are designed and produced specifically for use in all pneumatic tools and equipment. Because they emulsify permanently with air-borne moisture they give positive protection against rusting, corrosion, sticking and gumming. Use of "NR" grades of NON-FLUID OIL in your air tools will reduce wear to the very minimum and assure delivery of top power and operating efficiency.

Perhaps the best proof of NON-FLUID OIL's ability to perform is the fact that most manufacturers of pneumatic equipment use it and recommend it. But prove it to yourself . . . write for a free testing sample and Bulletin No. 550.

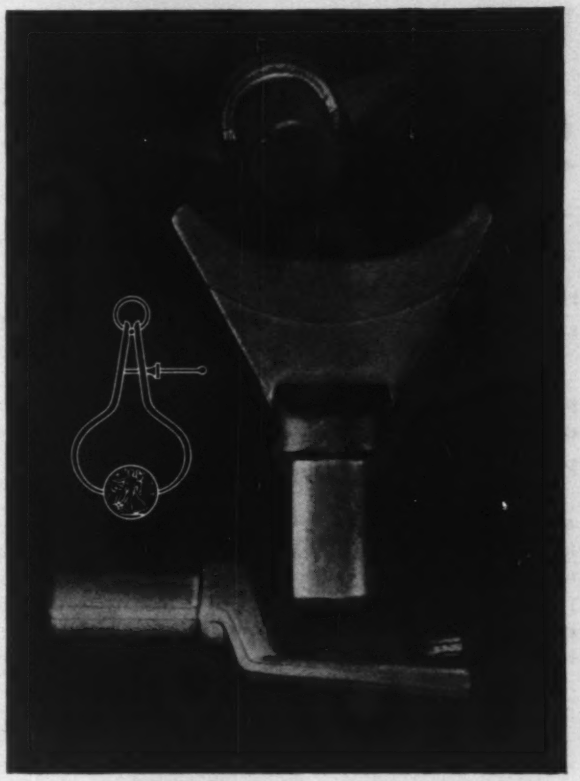
NEW YORK & NEW JERSEY LUBRICANT COMPANY
292 Madison Ave., New York 17, N. Y.
WORKS: NEWARK, N. J.
WAREHOUSES

Birmingham, Ala.	Providence, R. I.	Greensboro, N. C.	Chicago, Ill.
Charlotte, N. C.	Atlanta, Ga.	St. Louis, Mo.	Detroit, Mich.
Springfield, Mass.	Greenville, S. C.	Columbus, Ga.	

Also represented in principal industrial centers, including Pittsburgh, Pa., Cleveland and Cincinnati, Ohio.

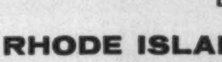
NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

RITCO FORGINGS



. . . their economy alone merits your design consideration!

Demonstrated savings in costly machining and assembly time alone make Ritco Forgings the logical choice for many product designers and engineers. Several other features make their application even more advantageous. Forged-in toughness is one. Their dense, fibrous structure and controlled grain flow concentrate extra strength and impact resistance at points of greatest shock and stress. Consider, too, that Ritco "Bright Finish" Forgings are made to close-tolerance specifications with smooth, flaw-free surfaces to eliminate any additional finishing operations. All things considered, it will pay you to write Ritco Forgings into your specifications. Send us your blueprints for estimates at no obligation.



Ritco also offers complete machining facilities and makes Special Fasteners and Upsets of ferrous and non-ferrous metals. What are your requirements?

RHODE ISLAND TOOL COMPANY
Member Drop Forging Association
144 WEST RIVER STREET • PROVIDENCE 1, R. I.

World Steel Output Sets New Record

First half of 1960 saw a new record established for world steel production.

Shipments by U. S. mills in the period were fourth-best; and domestic mills accounted for 32 pct of world production.

▪ World steel production in the first six months of the year set a new output record for half year output at 187 million net tons, according to the Iron and Steel Div., Business and Defense Services Administration, U. S. Dept. of Commerce.

BDSA expects 1960 to be a record year for steel production, substantially exceeding the 1959 high of 318 million tons.

First-half production topped the same 1959 period by 14 million tons. All major steel-producing countries except the U. S. recorded increases.

Mill Shipments — Shipments of finished steel products direct from U. S. mills totaled 42,853,937 net tons during the period, according to the American Iron and Steel Institute. This figure has been exceeded only in the first halves of 1959, 1957 and 1956.

While U. S. production trailed the year ago period by 3.6 million tons, it still accounted for 32 pct of world production. Highest rates of increase in foreign countries were: 40 pct for Japan, 30 pct for Italy, 28 pct for the United Kingdom, and 23 pct of West Germany.

Largest Users — During the period, automotive users took 20.8 pct of U. S. steel shipments, down from 21.1 pct the year before. Warehouses and distributors received 18.6 pct of shipments during the six months, compared with 18.8 pct in 1959.

Next largest customer was the construction classification which accounted for 13.5 pct of shipments, up slightly from 13.2 pct in the first six months of 1959.

Sheet and Strip—In most areas flat-rolled products continue to be the strongest product in the market. However, the pickup in orders has generally been far below what was hoped for or expected for August Automaking is still the key. **Pittsburgh** mills say this month's orders for cold-rolled sheet are about the same as July. Steel orders continue to show a modest increase in the **Cleveland** area. However, direct orders from automakers for cold-rolled sheet are ahead of those from their suppliers. Mills look for a further increase when the suppliers start receiving releases. In general, **Chicago** steel mills don't expect much of an increase before September because of automotive changeovers.

Galvanized and Tinplate — Producers of galvanized steel are running fairly strong in **Pittsburgh.** But demand for tinplate is beginning to ease. In the **Chicago** district, galvanized products are in plentiful supply. In some cases, if specifications are right, it can be supplied from stock. And at least one jobber has announced a 5 pct cut in hot-dip galvanizing prices.

Bars—Bar mills are resigned to another dismal month. No improvement in the order rate has been reported by **Pittsburgh** mills. Some increase in orders for forging quality bars is reported in **Cleveland.** And interest in bars is said to be lower than for most products in **Chicago.**

Structurals and Plate—Customer inventories on the **East Coast** are now about in line with output. However, most buyers depend on mills to make fast deliveries. One mill estimates customers are operating at only 50 pct of capacity. **Pittsburgh** mills expect August to be worse than July. However, a growing demand for large diameter pipe in the **Chicago** district has established a fairly good demand for light pipe in that area.

PURCHASING AGENT'S CHECKLIST

Valuable business data is available at Dept. of Commerce field offices. P. 149

New markets open for makers of small diesel engines. P. 155

What's new in machine tools? Complete rundown on coming Machine Tool Exposition . . . begins on p. 193.

Barbed Wire Stays On Duty-Free List

The barbed wire industry's plea for a tariff on foreign imports has been turned down by the U. S. Tariff Commission.

Barbed wire will remain a free-of-duty import.

The Commission found that it is not being imported into the U. S. in such increased quantities as to cause or threaten serious injury to the domestic industry. On that basis, the Commission made no recommendation to the President for the modification or withdrawal of the barbed wire concession.

The U. S. barbed wire industry's plea was made under the "escape clause" in the U. S. Trade Agreements Act. The act allows the President to modify tariff concession if it is found the import "causes or threatens serious injury" to the domestic industry.

COMPARISON OF PRICES

(Effective Aug. 9, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Aug. 9 1960	Aug. 2 1960	July 12 1960	Aug. 11 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Aug. 9 1960	Aug. 2 1960	July 12 1960	Aug.11 1959
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, South Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$30.50	$30.50	$30.50	$43.50
No. 1 steel, Phila. area	33.50	33.50	33.50	39.50
No. 1 steel, Chicago	31.50	31.50	29.50	36.50
No. 1 bundles, Detroit	29.50	29.50	27.50	37.50
Low phos., Youngstown	34.50	34.50	33.50	44.50
No. 1 mach'y cast, Pittsburgh	47.50	47.50	48.50	52.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	50.50
No. 1 mach'y cast, Chicago	46.50	46.50	45.50	59.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$31.83	$31.83	$31.17	$39.83
No. 2 bundles	21.50	21.50	21.17	27.50
Coke, Connelsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	30.00
Copper, Lake, Conn.	33.00	33.00	33.00	30.00
Tin, Straits, N. Y.	103.625	104.625	102.625	102.00
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	11.80
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickle, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

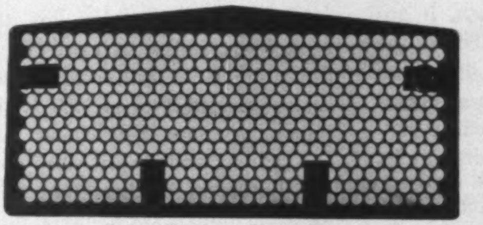
Steel Scrap Composites

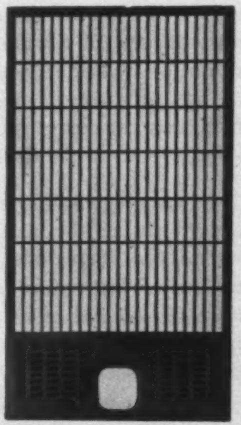
Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 327
Comparison of Prices 331
Bars 339
Billets, Blooms and Slabs 337
Boiler Tubes 343
Clad Steel 343
Coke 342
Electrical Sheets 343
Electrodes 343
Electroplating Supplies 343
Fasteners 341
Ferroalloys*
Iron Ore 341
Merchant Wire Products 341
Metal Powders 343
Nonferrous
  Mill Products 336
  Primary Prices 331-334-336
  Remelted Metals 336
  Scrap 336
Piling 337
Pig Iron 341
Pipe and Tubing 342
Plates 339
Rails 343
Refractories 343
Service Center Prices 340
Shapes 337
Sheets 338
Spring Steel 343
Stainless 341
Steel Scrap 333
Strip 337
Structurals 337
Tinplate 338
Tool Steel 341
Track Supplies 343
Water Pipe Index 342
Wire 339
Wire Rod 338

* Appears in the Aug. 4 - Aug. 18 issues.





Rodent Guard for Electric Motor

Grille for Electric Heater

THEY SAVE MONEY
by letting
"DIAMOND" DO IT

For nearly half a century we have been furnishing perforated metal sheets, plates and parts to manufacturers of industrial equipment and household appliances, at lower cost than if the work were done in their own shops. No magic — just because we are especially equipped and organized for that type of work.

Let us quote on YOUR requirements. When given sufficient information, our experienced engineers are often able to make money-saving suggestions and always welcome an opportunity to do so.

Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

DIAMOND MANUFACTURING CO., WYOMING (Wilkes Barre Area) PENNA

Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

Market Poised For Upward Move

The overall scrap picture shows stable areas and some faint signs of strength.

Many dealers seem to sense a rising trend in prices. So, they aren't too anxious to sell at the current levels.

▪ Pittsburgh reports this week that the whole market seems poised for an upward move. But consumer demand is still lagging. Generally speaking, that's the overall picture too this week.

Several key locations note that markets are either stable or showing some signs of strength. It appears as sort of a calm before the storm. Many dealers say they sense an upward swing of prices. Therefore, they are not particularly anxious to sell at the current prices.

Exports Again—In several areas, exports sustain the market. But the outlook for September exports is not rosy. Most orders have already been placed and more are not anticipated. St. Louis, where prices dropped back last week, again shows signs of strength. Brokers in the South are apparently having trouble placing orders at the present prices.

On the West Coast, there is next to nothing in the domestic market. In the East the market, excluding exports, remains about the same. The strongest tones seem to be coming from the Midwest.

Pittsburgh — The market continues to show signs of strength, but there is little new activity in dealer openhearth grades. One local consumer has paid $24 for special quality turnings. The whole market seems poised for an upward move. But consumer demand is still lagging.

Chicago—There is still an undertone of quiet strength in the market. But there is not quite as much optimism as last week when prices went up. The higher prices reportedly aren't being backed up. Dealers say they are not getting the support they expected from mills. Brokers say that dealers seem reluctant to sell at current prices because they may be sensing another upward price move.

Philadelphia — Dealers say the market is "stable to steady" but leaves much to be desired. One dealer summed it up as "still dead." Exports continue to bring the only real activity and dealers are "hoping the export business stays with us." The outlook for domestic business in September is not good since most of the business for next month is already on the order pads.

New York — Exporters need steelmaking scrap as bad as the New York dealers need the business. Prices look firm at the current levels. But there is little chance of any hike at least through August. Most dealers also agree that the chance of a drop in steelmaking grades is also dim for this period.

Detroit—Excitement caused by the August industrial list isn't filtering down to the dealer level. There are scattered sales of such grades as No. 2 dealer bundles and mixed cupola cast. But there are no solid orders. Industrial scrap bought off the last list is filling mill needs for present.

Cleveland — Foundry steel showed some activity but the openhearth grades are still quiet. A foundry bought 2 ft foundry steel at $35 with a $2 springboard for out-of-town shipments.

Cincinnati — Dealers are fairly well stocked but area mills aren't interested. So only small shipments are being made as dealers let some cars go to make expenses. An increase in demand would push prices up and this is what the dealers are waiting for.

St. Louis—The market is once again showing some signs of strength. However, except for increases in some railroad items, prices hold unchanged. Mills have entered the market for limited amounts of scrap. Dealer resistance is mounting and they are not too anxious to sell at present prices.

Birmingham—Although brokers have not changed their quotations for No. 1 cupola cast and stove plate, they are having hard times trying to place orders at the present prices. Turnings are lower, with little market.

Buffalo—Dealers are expecting no new activity after one of the deadest weeks of the summer. The market is virtually inactive and prices remain unchanged.

Boston—Sentiment is a little better this week and there is some export. The export, though on a small scale still, is sustaining the market here. Prices are unchanged and there are no cases of optimism.

West Coast—The domestic market remains alost dead except for limited mill buying. The feeling is getting stronger that Japan will buy less scrap in the final quarter.

Houston—The market is still in the doldrums. There is little activity on either the domestic or export fronts. The outlook for exports is slow until at least the end of the month. Export brokers are anticipating some orders from Mexico.

SCRAP PRICES *(Effective Aug. 9, 1960)*

Pittsburgh

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	38.00 to 39.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Low phos. punch'gs plate	37.00 to 38.00
Heavy turnings	27.00 to 28.00
No. 1 RR hvy. melting	36.00 to 37.00
Scrap rails, random lgth.	46.00 to 47.00
Rails 2 ft and under	50.00 to 51.00
RR specialties	48.00 to 49.00
No. 1 machinery cast	47.00 to 48.00
Cupola cast	39.00 to 40.00
Heavy breakable cast.	37.00 to 38.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	85.00 to 90.00
430 bundles and solids	90.00 to 95.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	31.00 to 32.00
No. 1 factory bundles	37.00 to 38.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	42.00 to 43.00
Low phos. punch'gs plate, ¼ in. and heavier	37.00 to 38.00
Low phos. 2 ft. and under	35.00 to 36.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	42.00 to 43.00
Rerolling rails	53.00 to 54.00
Rails 2 ft. and under	48.00 to 49.00
Angles and splice bars	43.00 to 44.00
RR steel car axles	47.00 to 50.00
RR couplers and knuckles	40.00 to 41.00
No. 1 machinery cast.	46.00 to 47.00
Cupola cast.	41.00 to 42.00
Cast iron wheels	32.00 to 33.00
Malleable	45.00 to 46.00
Stove plate	34.00 to 36.00
Steel car wheels	37.00 to 38.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	85.00 to 90.00
430 bundles and solids	85.00 to 90.00
430 turnings	40.00 to 50.00

Philadelphia Area

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	20.00 to 21.00
Clean cast. chem. borings	23.00 to 24.00
Low phos. 5 ft and under	37.00 to 38.00
Low phos. 2 ft punch'gs	39.00 to 40.00
Elec. furnace bundles	36.00 to 37.00
Heavy turnings	27.00 to 28.00
RR specialties	39.00 to 40.00
Rails, 18 in. and under	51.00 to 52.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	37.00 to 38.00
Cast iron car wheels	40.00 to 41.00
Malleable	45.00 to 46.00
No. 1 machinery cast	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.50 to $27.50
No. 2 hvy. melting	22.50 to 23.50
No. 1 dealer bundles	26.50 to 27.50
No. 2 bundles	17.50 to 18.50
Machine shop turn.	10.00 to 11.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Low phos. 18 in. and under	35.00 to 36.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	50.00 to 51.00
No. 1 cupola cast.	35.00 to 36.00
Hvy. breakable cast.	31.00 to 32.00
Drop broken cast.	48.00 to 49.00

Youngstown

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Low phos. plate	34.00 to 35.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Cleveland

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	29.50 to 30.50
No. 1 factory bundles	34.50 to 35.50
No. 2 bundles	18.00 to 19.00
No. 1 busheling	29.50 to 30.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft. & under	37.00 to 38.00
Low phos. punch'gs plate	30.50 to 31.50
Drop forge flashings	29.50 to 30.50
Foundry steel, 2 ft. & under	34.00 to 35.00
No. 1 RR hvy. melting	34.50 to 35.50
Rails 2 ft. and under	49.00 to 50.00
Rails 18 in. and under	50.00 to 51.00
Steel axle turnings	24.00 to 25.00
Railroad cast.	47.00 to 48.00
No. 1 machinery cast.	50.00 to 51.00
Stove plate	39.00 to 40.00
Malleable	45.00 to 46.00
Stainless	
18-8 bundles	180.00 to 185.00
18-8 turnings	75.00 to 80.00
430 bundles	80.00 to 85.00

Buffalo

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 busheling	29.00 to 30.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Low phos. plate	36.00 to 37.00
Structurals and plate, 2 ft. and under	36.00 to 37.00
Scrap rails, random lgth.	37.00 to 38.00
Rails 2 ft. and under	47.00 to 48.00
No. 1 machinery cast.	45.00 to 46.00
No. 1 cupola cast	40.00 to 41.00

St. Louis

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft.	31.00 to 32.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	8.00 to 9.00
Shoveling turnings	10.00 to 11.00
Cast iron borings	20.00 to 21.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	40.00 to 41.00
RR specialties	39.00 to 40.00
Cupola cast.	42.00 to 43.00
Heavy breakable cast.	34.00 to 35.00
Stove plate	35.00 to 36.00
Cast iron car wheels	35.00 to 36.00
Rerolling rails	50.00 to 51.00
Unstripped motor blocks	36.00 to 37.00

Birmingham

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	32.00 to 33.00
Elec. furnace, 3 ft. & under	32.00 to 33.00
Bar crops and plate	37.00 to 38.00
Structural and plate, 2 ft.	38.00 to 39.00
No. 1 RR hvy. melting	30.00 to 31.00
Scrap rail, random lgth.	39.00 to 40.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	37.00 to 38.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	38.00 to 39.00
Unstripped motor blocks	34.00 to 35.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	21.00 to 22.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	7.00 to 8.00
Mixed bor. and turn.	9.00 to 10.00
Shoveling turnings	10.00 to 11.00
Clean cast. chem. borings	18.00 to 19.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stainless	
18-8 prepared solids	165.00 to 170.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	26.00 to 27.00
Drop forge flashings	26.00 to 27.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	30.00 to 31.00
Mixed cupola cast.	35.00 to 36.00
Automotive cast.	42.00 to 43.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	60.00 to 65.00
430 bundles and solids	60.00 to 65.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.00 to $24.50
No. 2 hvy. melting	20.00 to 21.00
No. 1 dealer bundles	24.00 to 24.50
No. 2 bundles	14.00 to 15.00
No. 1 busheling	24.00 to 24.50
Machine shop turn.	5.00 to 6.00
Shoveling turnings	8.00 to 9.00
Clean cast. chem. borings	12.00 to 13.00
No. 1 machinery cast	38.00 to 39.00
Mixed cupola cast.	32.00 to 33.00
Heavy breakable cast.	27.50 to 28.50

San Francisco

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	30.00
No. 2 bundles	20.00
Machine shop turn.	$14.00 to 15.00
Cast iron borings	14.00 to 15.00
No. 1 cupola bast.	46.00

Los Angeles

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	27.00
No. 2 bundles	17.00
Machine shop turn.	13.00
Shoveling turnings	15.00
Cast iron borings	$15.00 to 16.00
Elec. furnace 1 ft. and under (foundry)	42.00 to 43.00
No. 1 cupola cast.	42.00 to 43.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast	36.00
Mixed yard cast	36.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$25.80
No. 2 hvy. melting cut 3 ft. and under	22.50
No. 1 dealer bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Bush., new fact., prep'd	25.50
Bush, new fact., unprep'd	20.45
Machine shop turn.	12.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	33.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	18.00
Machine shop turn.	12.00
Shoveling turnings	14.00
Cut structural plate 2 ft. & under	$40.00 to 41.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	32.00 to 33.00
Heavy breakable cast.	25.00 to 26.00

T-Metal Sales Will Aid Zinc Market

New series of zinc-titanium-copper alloys are expected to lick many of the problems of rolled zinc products.

They have strong potential in building and automotive markets.

▪ Big things are expected from a relatively new series of zinc-titanium-copper alloys. Officially known under several trade names, they are widely called T-metal.

Because of them, zinc skyscrapers will eventually start appearing alongside the current stainless and anodized aluminum towers. It won't happen this year or next. But it's coming.

Consumption Climb? — In addition, the steady downturn in U. S. consumption of rolled zinc since World War II will come to an abrupt halt. The market will turn around and start climbing. Within five years it should top 1959 by about 1000 pct. That trend will begin this year or next.

The spur to both these revolutions is the new alloys — widely regarded as the greatest thing to happen in the zinc industry in years.

Problem Solvers — Here's why they are important:

The major problem with rolled zinc products is lack of creep resistance. They stretch. A zinc gutter, for instance, will begin to sag in just a few months, even bearing no appreciable weight.

Also, rolled zinc tends to recrystallize, making it coarse and brittle,

The companies involved in T-metal say their product has overcome these difficulties.

Basic commercial development of T-metal was completed by New Jersey Zinc Co., and Hydrometals, Inc. New Jersey holds a basic patent, and Hydrometals has applied for patents in 34 countries on a slightly different range of T-metal alloys.

New Jersey Zinc has licensed American Zinc, Lead and Smelting Co., Bridgeport Rolling Mills Co., Matthiessen & Hegler Zinc Co., as well as Hydrometals. Royalties are low enough so that once T-metal starts making real market penetration other companies are almost certain to enter the field.

Potential Markets—One industry source says there are many excellent market possibilities for T-metal. But most of these will take years to develop. One that won't is building.

The industry expects the initial impact of T-metal to come in residential building, for items such as flashings, gutters and down spouts, roofing and shingles, frames and ductwork. It could expand from there.

T-metal curtain walls are now being built experimentally. One approach is a T-metal sandwich with a colored finish on the outside. Another uses steel as the base metal, clad with T-metal.

Experts see little immediate market potential for T-metal siding, mainly because it is more expensive than competitive materials. However, some has been sold in seacoast areas because of its very superior resistance to salt-air corrosion.

Auto Applications? — The auto market stacks up as a good potential one—eventually. Expanded T-metal grillwork has already been field tested and is now being evaluated. And work is being done on experimental T-metal radiators.

Aluminum

Aluminum Co. of America has struck "pig" from its list.

Customers now get unalloyed ingot for what they used to pay for pig. Basically, Alcoa is passing along the fruits of technological progress.

Pig is metal straight from the electrolytic pots. Unalloyed ingot is metal carried molten from pot to furnace where it is further treated to improve its appearance, internal cleanliness, and uniformity.

Progress in the last few years in ingot-making techniques has closed the cost gap between the two. Ingot still takes more effort to produce than pig—but nowhere near as much more as it used to.

In fact, Aluminium Ltd., the Canadian aluminum producer, has been selling ingot at pig prices in the U. S. for years.

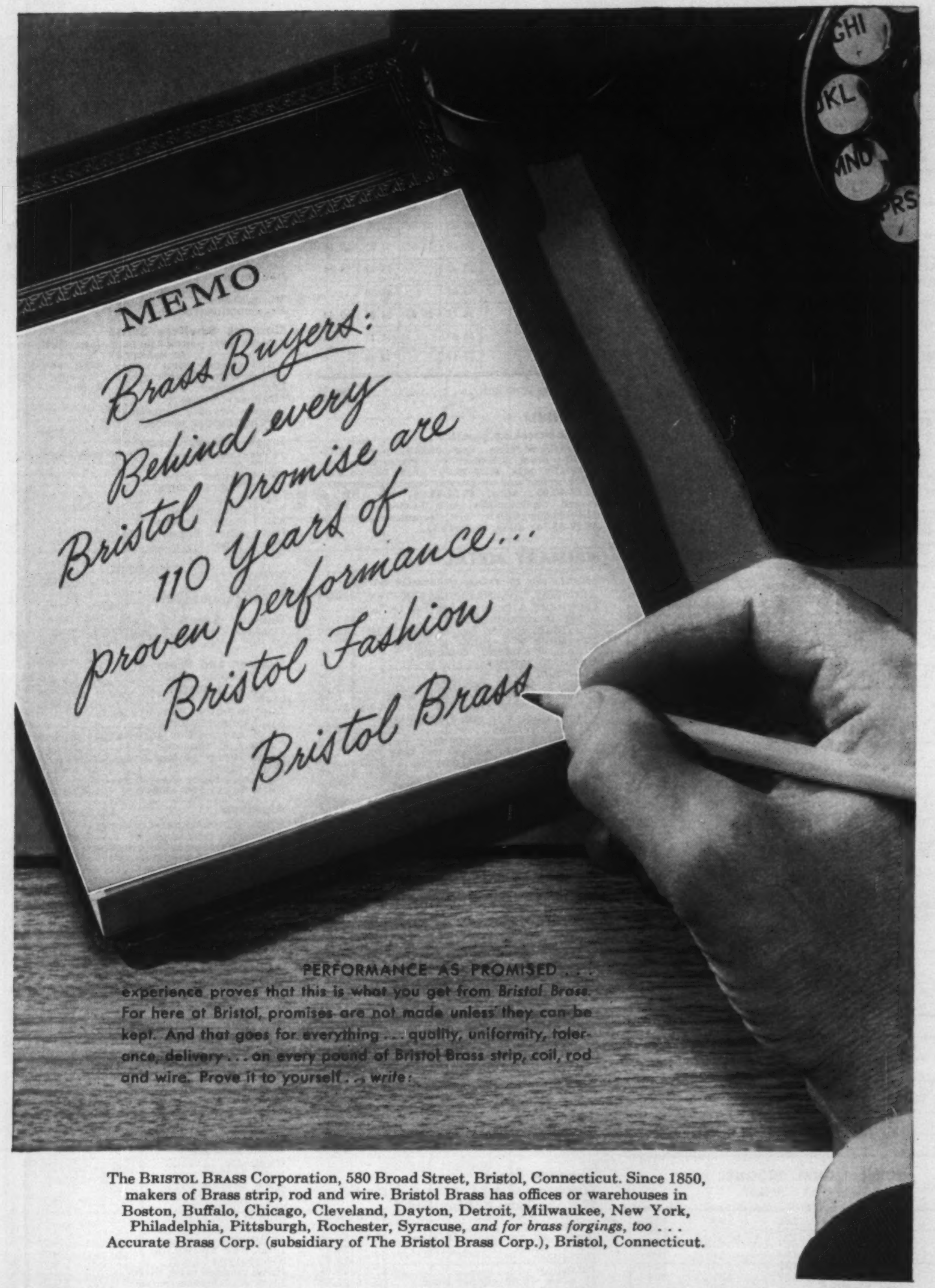
Tin prices for the week: Aug. 3—104.375; Aug. 4—104.375; Aug. 5—104.00; Aug. 8—103.625; Aug. 9—103.50*.

* Estimate

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 336.



MEMO

Brass Buyers:
Behind every
Bristol promise are
110 Years of
proven performance...
Bristol Fashion
Bristol Brass

PERFORMANCE AS PROMISED . . . experience proves that this is what you get from *Bristol Brass.* For here at Bristol, promises are not made unless they can be kept. And that goes for everything . . . quality, uniformity, tolerance, delivery . . . on every pound of Bristol Brass strip, coil, rod and wire. Prove it to yourself . . . *write:*

The BRISTOL BRASS Corporation, 580 Broad Street, Bristol, Connecticut. Since 1850, makers of Brass strip, rod and wire. Bristol Brass has offices or warehouses in Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, Syracuse, *and for brass forgings, too . . .* Accurate Brass Corp. (subsidiary of The Bristol Brass Corp.), Bristol, Connecticut.

"BRISTOL FASHION" MEANS BRASS AT ITS BEST

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand, Grade	......	67.9	69.0	77.9	103.1
AZ31B Spec.	......	93.3	96.9	108.7	171.3
Tread Plate	......	70.6	71.7	......	......
Tooling Plate	73.0	......	......	......	......

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	....	48.68	58.78
Muntz Metal	53.20	....	48.26	....
Momm. Bz.	56.17	56.46	55.86	59.48
Mang. Bz.	58.86	....	52.21	....
Phos. Bz. 5%	77.44	....	78.10	....

Free Cutting Brass Rod	36.06

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.	29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be	$65.00
Beryllium copper, per lb conta'd Be	$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading	$71.50
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.50
Calcium, 99.9% small lots	$ 4.55
Chromium, 99.8% metallic base	$ 1.31
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Germanium, per gm, f.o.b. Miami, Okla., refined	29.95 to 36.95
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$75 to $85
Lithium, 98%	$9.00 to $12.00
Magnesium sticks, 10,000 lb.	57.00
Mercury, dollars per 76-lb flask f.o.b. New York	$210 to $212
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel	69.60
Palladium, dollars per troy oz.	$24 to $26
Platinum, dollars per troy oz.	$82 to $85
Rhodium	$137 to $140
Silver ingots (¢ per troy oz.)	91.375
Thorium, per kg.	$43.00
Vanadium	$ 3.65
Zirconium sponge	$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	29.25
No. 120	28.25
No. 123	27.25
80-10-10 ingot	
No. 305	33.75
No. 315	31.50
88-10-2 ingot	
No. 210	42.00
No. 215	38.75
No. 245	34.00
Yellow ingot	
No. 405	23.75
Manganese bronze	
No. 421	28.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	25.75-26.00
0.60 copper max.	25.50-25.75
Piston alloys (No. 132 type)	28.00-29.00
No. 12 alum. (No. 2 grade)	24.75-25.25
108 alloy	25.25-25.75
195 alloy	27.75-28.75
13 alloy (0.60 copper max.)	25.75-26.00
AXS-679 (1 pct zinc)	25.00-26.00

(Effective Aug. 9, 1960)

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½%	25.25-26.25
Grade 2—92-95%	24.00-25.00
Grade 3—90-92%	23.00-24.00
Grade 4—85-90%	22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27½
No. 2 copper wire	25¾
Light copper	23½
*Refinery brass	23¾
Copper bearing material	22¾

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27¼
No. 2 copper wire	25¾
Light copper	23
No. 1 composition	21
No. 1 comp. turnings	20½
Hvy. yellow brass solids	16
Brass pipe	15
Radiators	17
Aluminum	
Mixed old cast.	13½—14
Mixed new clips	15 —15½
Mixed turnings, dry	14 —14½

Dealers' Scrap

(Dealers' Buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	23 —24
No. 2 copper wire	21½—22
Light copper	19½—20
Auto radiators (unsweated)	13¼—13¾
No. 1 composition	18 —18½
No. 1 composition turnings	16½—17
Cocks and faucets	13¾—14¼
Clean heavy yellow brass	12¾—13¼
Brass pipe	14¼—14¾
New soft brass clippings	14¼—14¾
No. 1 brass rod turnings	13¼—13¾

Aluminum

Alum. pistons and struts	7½— 8
Aluminum crankcase	11¼—11¾
1100 (2s) aluminum clippings	15 —15½
Old sheet and utensils	11¼—11¾
Borings and turnings	7 — 7½
Industrial castings	11¼—11¾
2020 (24s) clippings	12½—13

Zinc

New zinc clippings	7 — 7¼
Old zinc	4½— 5
Zinc routings	3¼— 3½
Old die cast scrap	2¾— 3

Nickel and Monel

Pure nickel clippings	52-54
Clean nickel turnings	40
Nickel anodes	52-54
Nickel rod ends	52-54
New Monel clippings	28-29
Clean Monel turnings	20-23
Old sheet Monel	24-26
Nickel silver clippings, mixed	18
Nickel silver turnings, mixed	15

Lead

Soft scrap lead	8 — 8¼
Battery plates (dry)	3 — 3¼
Batteries, acid free	2 — 2¼

Miscellaneous

Block tin	75 —76
No. 1 pewter	55 —56
Auto babbitt	39 —40
Mixed common babbitt	9¾—10¼
Solder joints	13¼—13¾
Siphon tops	41
Small foundry type	9¾—10¼
Monotype	9¾—10¼
Lino. and stereotype	8¾— 9
Electrotype	7½— 7¾
Hand picked type shells	5¼— 5¾
Lino. and stereo. dross	2¼— 2¾
Electro dross	2¼— 2¾

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Castle, Pa.									7.425* *M8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1; C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Aug. 8, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling 29 ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

*7.425 at Sharon-Niles is 7.225

(Effective Aug. 8, 1960)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, B5*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Aug. 8, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1	Acme Steel Co., Chicago
A2	Alan Wood Steel Co., Conshohocken, Pa.
A3	Allegheny Ludlum Steel Corp., Pittsburgh
A4	American Cladmetals Co., Carnegie, Pa.
A5	American Steel & Wire Div., Cleveland
A6	Angel Nail & Chaplet Co., Cleveland
A7	Armco Steel Corp., Middletown, Ohio
A8	Atlantic Steel Co., Atlanta, Ga.
A9	Acme-Newport Steel Co., Newport, Ky.
A10	Alaska Steel Mills, Inc., Seattle, Wash.
B1	Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2	Bethlehem Steel Co., Pacific Coast Div.
B3	Bethlehem Steel Co., Bethlehem, Pa.
B4	Blair Strip Steel Co., New Castle, Pa.
B5	Bliss & Laughlin, Inc., Harvey, Ill.
B6	Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7	A. M. Byers, Pittsburgh
B8	Braeburn Alloy Steel Corp., Braeburn, Pa.
C1	Calstrip Steel Corp., Los Angeles
C2	Carpenter Steel Co., Reading, Pa.
C4	Claymont Products Dept., Claymont, Del.
C6	Colorado Fuel & Iron Corp., Denver
C7	Columbia Geneva Steel Div., San Francisco
C8	Columbia Steel & Shafting Co., Pittsburgh
C9	Continental Steel Corp., Kokomo, Ind.
C10	Copperweld Steel Co., Pittsburgh, Pa.
C11	Crucible Steel Co. of America, Pittsburgh
C13	Cuyahoga Steel & Wire Co., Cleveland
C14	Compressed Steel Shafting Co., Readville, Mass.
C15	G. O. Carlson, Inc., Thorndale, Pa.
C16	Connors Steel Div., Birmingham
C18	Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
D1	Detroit Steel Corp., Detroit
D2	Driver, Wilbur B., Co., Newark, N. J.
D3	Driver Harris Co., Harrison, N. J.
D4	Dickson Weatherproof Nail Co., Evanston, Ill.
E1	Eastern Stainless Steel Corp., Baltimore
E2	Empire-Reeves Steel Corp., Mansfield, O.
E3	Enamel Products & Plating Co., McKeesport, Pa.
F1	Firth Sterling, Inc., McKeesport, Pa.
F2	Fitzsimons Steel Corp., Youngstown
F3	Follansbee Steel Corp., Follansbee, W. Va.
G2	Granite City Steel Co., Granite City, Ill.
G3	Great Lakes Steel Corp., Detroit
G4	Greer Steel Co., Dover, O.
G5	Green River Steel Corp., Owenboro, Ky.
H1	Hanna Furnace Corp., Detroit
I2	Ingersoll Steel Div., New Castle, Ind.
I3	Inland Steel Co., Chicago, Ill.
I4	Interlake Iron Corp., Cleveland
J1	Jackson Iron & Steel Co., Jackson, O.
J2	Jessop Steel Corp., Washington, Pa.
J3	Jones & Laughlin Steel Corp., Pittsburgh
J4	Joslyn Mfg. & Supply Co., Chicago
J5	Judson Steel Corp., Emeryville, Calif.
K1	Kaiser Steel Corp., Fontana, Calif.
K2	Keystone Steel & Wire Co., Peoria
K4	Keystone Drawn Steel Co., Spring City, Pa.
L1	Laclede Steel Co., St. Louis
L2	La Salle Steel Co., Chicago
L3	Lone Star Steel Co., Dallas
L4	Lukens Steel Co., Coatesville, Pa.
M1	Mahoning Valley Steel Co., Niles, O.
M2	McLouth Steel Corp., Detroit
M3	Mercer Tube & Mfg. Co., Sharon, Pa.
M4	Mid States Steel & Wire Co., Crawfordsville, Ind.
M7	Milton Steel Products Div., Milton, Pa.
M8	Mill Strip Products Co., Evanston, Ill.
M9	Moltrup Steel Products Co., Beaver Falls, Pa.
M10	Mill Strip Products Co., New Castle, Pa.
N1	National Supply Co., Pittsburgh
N2	National Tube Div., Pittsburgh
N4	Northwestern Steel & Wire Co., Sterling, Ill.
N6	Northwest Steel Rolling Mills, Seattle
N7	Newman Crosby Steel Co., Pawtucket, R. I.
N8	Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9	Nelson Steel & Wire Co.
O1	Oliver Iron & Steel Co., Pittsburgh
O2	Oregon Steel Mills, Portland
P1	Page Steel & Wire Div., Monessen, Pa.
P2	Phoenix Steel Corp., Phoenixville, Pa.
P3	Pilgrim Drawn Steel Div., Plymouth, Mich.
P4	Pittsburgh Coke & Chemical Co., Pittsburgh
P6	Pittsburgh Steel Co., Pittsburgh
P7	Portsmouth Div., Detroit Steel Corp., Detroit
P8	Plymouth Steel Co., Detroit
P9	Pacific States Steel Co., Niles, Cal.
P10	Precision Drawn Steel Co., Camden, N. J.
P11	Production Steel Strip Corp., Detroit
P13	Phoenix Mfg. Co., Joliet, Ill.
P14	Pacific Tube Co.
P15	Philadelphia Steel and Wire Corp.
R1	Reeves Steel & Mfg. Div., Dover, O.
R2	Reliance Div., Eaton Mfg. Co., Massillon, O.
R3	Republic Steel Corp., Cleveland
R4	Roebling Sons Co., John A., Trenton, N. J.
R5	Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6	Rodney Metals, Inc., New Bedford, Mass.
R7	Rome Strip Steel Co., Rome, N. Y.
S1	Sharon Steel Corp., Sharon Pa.
S2	Sheffield Steel Div., Kansas City
S3	Shenango Furnace Co., Pittsburgh
S4	Simonds Saw and Steel Co., Fitchburg, Mass.
S5	Sweet's Steel Co., Williamsport, Pa.
S7	Stanley Works, New Britain, Conn.
S8	Superior Drawn Steel Co., Monaca, Pa.
S9	Superior Steel Div. of Copperweld Steel Co.,
S10	Seneca Steel Service, Buffalo
S11	Southern Electric Steel Co., Birmingham
S12	Sierra Drawn Steel Corp., Los Angeles, Calif.
S13	Seymour Mfg. Co., Seymour, Conn.
S14	Screw and Bolt Corp. of America, Pittsburgh, Pa.
T1	Tonawanda Iron Div., N. Tonawanda, N. Y.
T2	Tennessee Coal & Iron Div., Fairfield
T3	Tennessee Products & Chem. Corp., Nashville
T4	Thomas Strip Div., Warren, O.
T5	Timken Steel & Tube Div., Canton, O.
T7	Texas Steel Co., Fort Worth
T8	Thompson Wire Co., Boston
U1	United States Steel Corp., Pittsburgh
U2	Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3	Ulbrich Stainless Steels, Wallingford, Conn.
U4	U. S. Pipe & Foundry Co., Birmingham
W1	Wallingford Steel Co., Wallingford, Conn.
W2	Washington Steel Corp., Washington, Pa.
W3	Weirton Steel Co., Weirton, W. Va.
W4	Wheatland Tube Co., Wheatland, Pa.
W5	Wheeling Steel Corp., Wheeling, W. Va.
W6	Wickwire Spencer Steel Div., Buffalo
W7	Wilson Steel & Wire Co., Chicago.
W8	Wisconsin Steel Div., S. Chicago, Ill.
W9	Woodward Iron Co., Woodward, Ala.
W10	Wyckoff Steel Co., Pittsburgh
W12	Wallace Barnes Steel Div., Bristol, Conn.
Y1	Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities		Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
	City Delivery‡ Charge	Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	....	....	....	....
Baltimore**	$.10	8.37	9.71	10.16	10.78	8.94	9.63	9.15	11.90	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	....	....	....
Boston**	.10	9.77	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.95	10.10	11.30	10.80	9.15	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.72	10.35	10.30	10.89	8.56	9.06	8.70	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.13	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	....	....	....	20.84
Detroit**	.15	8.98	10.61	10.65	11.26	8.93	9.62	9.01	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	10.03	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.59[1]	11.29	12.20	11.29	9.82	10.54	9.67	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.99	10.20	....	11.39	10.27	10.48	10.07	12.89	....	....	....	....
Milwaukee**	.15	8.86	10.49	10.44	11.03	8.70	9.28	8.84	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	....	....	8.90	8.65	9.20	8.90	10.70	....	....	....	....
Philadelphia**	.10	8.95	10.10	10.76	10.95	9.30	9.95	9.35	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.13	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	19.70	20.45
Portland**		10.20	12.05	12.35	12.20	10.35	10.80	10.20	16.65	18.50	17.45	20.75	20.25
San Francisco**	.10	10.27	11.79[2]	11.55	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.92	10.75	10.68	11.09	8.77	9.29	8.92	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.74	10.99	11.16	8.83	9.33	8.97	11.64	....	16.69	....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16: Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—13/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Aug. 8, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*..	62.00	62.50*	...	...	...
Birmingham *W9*..	62.00	62.50*	66.50	...	...
Birmingham *U4*..	62.00	62.50*	66.50	...	...
Buffalo *R3*.......	66.00	66.50	67.00	67.50	...
Buffalo *H1*.......	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*......	66.00	66.50	67.00	67.50	...
Chester *P2*.......	68.00	68.50	69.00	...	...
Chicago *I4*......	66.00	66.50	66.50	67.00	...
Cleveland *A5*....	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*....	66.00	66.50	66.50	67.00	...
Duluth *I4*........	66.00	66.50	66.50	67.00	71.00†
Erie *I4*...........	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*......	75.00	75.50	...	...	...
Geneva, Utah *C7*.	66.00	66.50	...	...	...
Granite City *G2*..	67.90	68.40	68.90	...	...
Hubbard *Y1*......	...	...	66.50	...	...
Ironton, Utah *C7*.	66.00	66.50	...		...
Lyles, Tenn. *T3*..	...	...	...	...	73.00
Midland *C11*.....	66.00	...	...	...	...
Minnequa *C6*....	68.00	68.50	69.00	...	...
Monessen *P6*....	66.00	...	...	...	...
Neville Is. *P4*....	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	...	66.50	67.00	67.50	...
Rockwood *T3*....	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*...	66.00	...	66.50	67.00	...
So. Chicago *R3*...	66.00	66.50	66.50	67.00	...
So. Chicago *W8*..	66.00	...	66.50	67.00	...
Swedeland *A2*...	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*........	66-00	66.50	66.50	67.00	...
Troy, N. Y. *R3*...	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*..	...	...	66.50	...	...

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk.	50
Hot galvanized and zinc plated—packaged	43.75
Hot galvanized and zinc plated—bulk	50

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Add 7½ pct for nuts assembled to bolts)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Discount Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	43.75	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* wensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa , *C2.*

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Discount Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 *lb*
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium..					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Aug. 8, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dsv. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	...	...	...	...	...	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
Sparrows Pt. *B3***	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50	......	......	......	......	......	......	......	......
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50	......	......	......	......	......	......	......	......
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Fontana *K1*	+6.25	......	+2.25	......	0.75	......	1.25	......	1.75	......	2.25	......	2.75	......	......	......	......	......	......	......	......	......
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50	......	......	......	......	......	......	......	......
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	......	......	......	......	......	......	......	......
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50	......	......	......	......	......	......	......	......
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

CAST IRON WATER PIPE INDEX

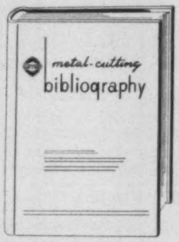
Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

If you're in metalcutting, you need this book . . .



METAL-CUTTING BIBLIOGRAPHY

. . . the most up-to-date work on chip producing processes

- 18,000 articles, papers, books in English and foreign languages reviewed
- 5,593 original articles abstracted for this edition
- The result of four years of research by The John Crerar Library in Chicago
- Beautiful library edition — hard cover, 1,000 pages, 8½" x 11" size

JUST $20 Publication date: September 15
ORDER YOUR COPY NOW! Please send check, money order or company purchase order.

American Society of Tool and Manufacturing Engineers
RESEARCH FUND
10700 Puritan Avenue, • Detroit 38, Michigan

stack-molding gives you lower-cost castings

This 2¼-pound gray iron casting is a generator part for an automotive electrical system.

COSTS were CUT by casting 60 at a time . . . 5 to a mold . . . 12 molds high.

If you have high-volume requirements for fairly flat parts . . . investigate STACK-MOLDING.

RELIABILITY . . . Uniformly high quality, with dependable composition and structure.

ACCURACY . . . Maintenance of close tolerances reduces production costs.

HIGH STRENGTH . . . Heat-treating facilities available to provide any desired properties.

to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

Contact . . .

OVERNIGHT DELIVERY WITHIN 500 MILES

GL GREAT LAKES FOUNDERS & MACHINE CORP.
LUDINGTON, MICH.
Specialists in Stack-, CO₂, and Shell-Mold Casting

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	16.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.50	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Item	Price
Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	48.00
Electrodeposited, 5000 lb lots	39.50
Brass, 80-20, ball anodes, 2000 lb or more	53.00
Zinc, ball anodes, 2000 lb lots	20.50
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium, 5000 lb	1.40

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Item	Price
Copper cyanide, 100 lb drum	65.90
Copper sulphate, 25.2 Cu min, 6000 to 12,000 lbs per cwt	$13.75
Nickel sulfate, 5000 to 23,000 lbs	29.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums	25.00
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Item	Price
Iron Powders	
Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots	25.75
Carbonyl Iron (200 lb lots)	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25
Copper Powders	
Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	46.5 to 64.5
Reduced	15.00†
Chemically Precipitated	15.00†
Brass, 5000-lb lots	35.1 to 52.2
Bronze, 5000-lb lots	53.1 to 56.7
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic	$1.00
Molybdenum	$3.60 to $4.35
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots	60.7 to 69.0
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	14.00†
Titanium, 99.25 + pct, per lb, f.o.b.	$11.25
Tungsten	$3.15 (nominal)

---

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30		
Trans. 58	16.80		
Trans. 52	17.85		

Grain Oriented	
Trans. 80	19.70
Trans. 73	20.20
Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	Plate 15 pct	Plate 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

(Effective Aug. 8, 1960)

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Item	Price
Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Item	Price
Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Item	Price
Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Item	Price
Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Item	Price
Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld
	OD-In.	B.W. Ga.	H.R.	C.D.	H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

ELECTRICAL POWER
EQUIPMENT IN STOCK

DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	New G.E.	Enc. S.V.	475	320
1	3000	New Whse.	Enc. F.V.	525	600
2	2700	G.E.	Enc. S.V.	415	280
1	2250	New G.E.	Enc. S.V.	600	200/300
1	2200	G.E.	Enc. S.V.	600	400/500
2	2000	G.E.	Enc. S.V.	350	230/350
2	1750	G.E.	Enc. S.V.	250	175/350
2	1500	Whse.		600	300/700
4	1500	New Whse.	Enc. F.V.	525	600
2	1400	G.E.	MCF	250	165/300
1	1300	G.E.	MCF-12	300	200/400
1	1200	G.E.	MCF	600	450/600
1	1000	Whse.		500	800/2000
4	1000	GM	D8	600	600/900
2	900	G.E.	MCF	250	180/360
1	850	G.E.	MCF	250	85/170
2	800	G.E.	MCF	250	400/750
2	800	G.E.	MCF	250	780
2	750	G.E.	MCF	600	450/900
1	750	G.E.	M.F.	600	120/360
2	645	S.S.	V.G.	300	1000
4	600	Whse.		250	275/550
1	500	G.E.	MPC-10	250	188/400
2	450	Whse.		550	415
4	400	G.M.	DS	250	300/900
2	400	G.E.	CY-275	300	1000/1500
1	300	Cr.Wh.	H-102 B.B.	230	1200
1	150	Cr.Wh.	CMC-65H	230	1150
1	150	G.E.B.B.	CD	600	250/750
1	150	G.E.B.B.	CDP-125	230	1750
1	125	Cont. B.B.		230	1750
1	100	G.E.	CDP-115	230	1750
1	80	Whse.	SK-123.9	240	2000-4500
1	75	G.E.B.B.	CD-1235-D.P.	600	850

SWITCH GEAR

Large Stock Oil & Air C/BC can furnish in NEMA 1 Enc. or Open Magnetic or Manual Operation. What are your needs & I. C. Requirements.

MG SETS—3 Ph. 60 CY.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	4800	G.E.	450	300	2300/4600
1	2400	G.E.	450	300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	1750	G.E.	514	600	2300/4600
1	1500	G.E.	720	600	6600/13200
1	1500	Cr.Wh. 4 unit	720	100	2300
1	1000	G.E.	900	600	2300/4000
1	1000	G.E.	720	250	2300/4150
1	1000	G.E.	900	260	4000/6900
1	500	G.E.	900	125/250	440
1	500	G.E.	900	250	2300/4600
1	500 (New)	G.E.	1200	300	2300
1	350	G.E.	900	125	440/2300/4160
1	300	G.E.	1200	250	2300/4000
1	300	G.E.	1200	250	440/2300
1	250	G.E.	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse.	1200	550	2200
1	200	El. Mhy.	1200	250	2300/4600
1	150	G.E.	1200	275	2300
1	150	Whse.	1200	275	2300
1	150	G.E.	1200	125	440
	140	Cr.Wh.	690	125/250	2300
1	100	G.E.	1170	250	220/440
2	100	Cr.Wh.	81160	525	220/550
1	100	G.E.	1200	250	2400/4100
2	75	Whse.	1200	125	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	3000	A.C.	OISC	3	34500 x 2300
3	1000	G.E.	OA/FA	1	13800 x 230/460
3	833	A.C.	OISC	1	4800/2400 x 480
3	833	A.C.	OISC	1	10175/13475 x 2300/4000
3	750	G.E.	Pyranol	1	4800 x 85/55-255/165
3	500	Mal.	C	1	6600/11430Yx480
3	500	Kuhl	OISC	1	13200 x 6600
3	333	A.C.	OISC	1	6900 x 460
3	200	A.C.	CBS	1	2400/4800 x 240/480
3	150	G.E.	OISC	1	33000x2300/4000Y
3	167	G.E.	HS	1	13800 x 240/480
3	100	G.E.	HS	1	4800/8320Y x 120/240

CRANE & MILL MOTORS
230 V. D. C.

Qu.	H.P.	Make	RPM	Type
12	12/14	Whse.	700/690	MCA-30, Series
1	20	Whse.	975	K-5 Series
2	23	G.E.	630	MDS-408 Shunt
1	35	Whse.	480	CK-9 Comp. S.B.
1	35	Whse.	480	CK-9 Sh. B.B.
1	45	Whse.	600	CK-9 Comp. S.B.
3	50	G.E.	650	COM-1830 Comp.
2	50	Whse.	525	CK-9 Shunt B.B.
2	50	Whse.	600	CK-9 Comp. B.B.
1	50	G.E.	525	COM-1830AEB.B.
1	50	Cr.Wh.	550	SW-50 Comp.
1	60	G.E.	500	MDS-414AE2 R.B.
9	125/165	G.E.	625/575	CO-1832 Ser.
1	100	G.E.	475	CO-1832 S.B.
6	100-140	Whse.	500/415	MC-90 B.B.

Above only partial listing of our available stock.

RE-NU-BILT By

BELYEA COMPANY, INC.
47 Howell St. Jersey City 6, N. J.
Tel. OLdfield 3-3334

Dealers Wonder If Slump Is Over

Used machinery dealers in the Midwest are cautiously watching August.

Hopes are running high that July's slump is over. In any case, September promises to be a good month.

■ Used machine dealers in the Midwest are hopeful of an upswing in sales starting soon. Business, which had been increasing in May and June, slumped off in July. Now there are some who believe August might produce some smiles.

But one tool man recently put it this way, "We're running scared right now."

The July slump isn't without exceptions. A few rebuilders report that they've spotted an upturn in their rate of inquiry. Some have even rehired men who were earlier laid off. But even these companies are not getting any firm gains just now.

A Good September—In reality, nearly all concerned are looking for a definite improvement in September. But they could all use the business—and badly—at this moment.

One of the surprise elements in the present market is the gain of foreign tools. These tools have done better, profitwise, in recent weeks than used tools. One Swedish equipment producer has advanced his prices to U. S. new tool levels and offers only 11-month delivery.

The only explanation appears to be a smaller stock of foreign tools. Foreign builders are doing very well at home and are not pushing their products here. Therefore, there is a stepup in local turnover of foreign tools, even though business volume hasn't improved greatly.

Some Sales — A few orders for large presses and press-brakes have moved some equipment on out-of-area sales. A few heavy pieces of turning and drilling equipment moved to the West Coast on defense orders. But the volume hasn't been enough to offset the "wait and see" attitude of local buyers.

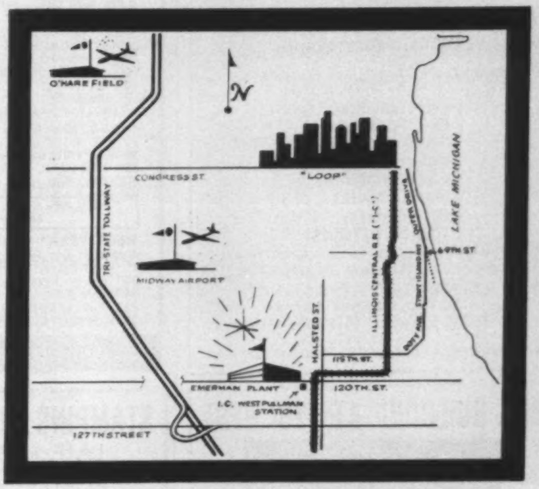
A symptom of the July letdown is that dealers and buyers are no longer stressing tight money. Reference to this was quite common during May and June. Machine tool buyers are less worried about financing and money costs now. They are concentrating, instead, on the second-half outlook. Until they see a definite upswing in manufacturing activity, they are holding off on purchases.

The Poor Showing—The August outlook isn't really bad. Buyers indicate they've established their own need for equipment. An upward August movement will definitely trigger some new sales.

The most disturbing factor to tool men is the poor showing of rebuilt tools. Tool rebuilding generally requires a fair lead time. It is normally finished prior to fall manufacturing upswings.

Also, the July lag was not limited to any particular tool type. Tool room equipment, sheet metal fabricating equipment, and heavy production equipment are equally hanging in the balance. A few price cuts are reported, but this is not general.

You are invited to visit the Emerman facilities and inspect the largest selection of the most modern machine tools ever assembled.



OPEN HOUSE AT EMERMAN

for the Machine Tool Exposition September 6-16

Come by cab—WE WILL PICK UP THE TAB
Come by our station wagon—
DOOR-TO-DOOR wherever you are
Come by train—
I.C.R.R.—COMMUTER SERVICE TO OUR FRONT DOOR

And we'll have a delicious lunch together while your here.

EXAMPLES OF LATE MODEL MACHINE TOOLS FROM OUR SENSATIONAL STOCK

2⅝" Conomatic 6-spdl. Auto. Screw Machine, Ser. 8059-SE, 1955

#322 Heald Prec. D.E. Boring Machine, Ser. 32086, 1952

#422 Heald Prec. D.E. Boring Machine, Ser. 33208, 1953

#112C Ex-Cell-O Horiz. Prec. S.E. Boring Machine, Ser. 5948, 1951

#321 Heald Prec. S.E. Boring Machine, Ser. 31741, 1952

#421 Heald Prec. S.E. Boring Machine, Ser. 32689, 1952

#2112A Ex-Cell-O Prec. S.E. Boring Machine, Ser. 11246, 1956

4" Bullard Horiz. Boring Mill, Model 4554, Ser. 27477, 1952

36" King Vert. Boring Mill, Ser. M-36-550, 1952

42" Bullard Man-Au-Trol Boring Mill, Ser. 27028, 1952

42-50 Niles Vert. Boring Mill, Ser. 23835, 1952

HP40 LaPointe Horiz. Broach, Ser. 53105, 1952

5 Ton Cincinnati Duplex Vert. Broach, Ser. 4E2V5A-1, 1954

5 Ton LaPointe Vert. Broach, Ser. 55058, 1955

10 Ton Cincinnati Duplex Vert. Broach, Ser. 4E3V1Z-15, 1954

10 Ton LaPointe Vert. Broach, Ser. 52021, 1952

25 Ton 66" LaPointe Dual Vert. Broach, Ser. 51018, 1951

24" Cincinnati Bickford H.D. Drill, Ser. 2L-3294, 1952

7-spdl. Baush W-7 Prod. Vert. Spdl. Drill, Ser. 7685, 1950

5'13" Cincinnati Bickford Radial Drill, Ser. 3E1364, 1953

C4B Natco Mult. Drill, Ser. C4B-1108, 1951

#16-16 Barber Colman Gear Hobber, Ser. 2926, 1952

6" x 18" Norton Hyd. Cyl. Plain Grinder, Ser. 24140, 1952

10" x 36" Landis Angle CH Cyl. Plain-Grinder, Ser. 481-5, 1952

10" x 72" Norton CTU, Cyl. Plain Grinder, Ser. 25143, 1954

14" x 36" Norton Angle Cyl. Plain Grinder, Ser. 23416, 1952

16" x 48" Cincinnati Cyl. Universal Grinder Filmatic, Ser. 3U4E5D-3, 1956

25" x 72" Landis Crank Grinder, Hyd. Truing Attach., Ser. 457-11, 1952

#240 Besley Dbl. Horiz. Disc. Grinder, Brand new.

#16-38 Bryant Internal Grinder, Ser. P-9994, 1952

16" x 72" Cincinnati Roll Grinder, Crown Attach., Ser. 1P5F1Y-3, '54

#721 Micromatic Hone, Ser. N721-152, 1953

Model KDM 18/150 New Britain Gridley Tracer Lathe, Ser. 31664, 1953

#5 Warner & Swasey Ram Type Turret Lathe, Bar Feed, Ser. 1241291, 1952

#2L Gisholt Saddle Type Turret Lathe, Ser. 3226-15, 1953

#4L Gisholt Saddle Type Turret Lathe, Ser. 984-8, 1950

#3CSM Kearney & Trecker Plain Horiz. Miller, Ser. 37-7098, 1952

#6CK Kearney & Trecker Plain Horiz. Miller, Ser. 8-7253, 1952

#3CH Kearney & Trecker Vert. Miller, Mono-Lever Cont., Ser. 14-7375, 1954

#4 Cincinnati, HSDT Vert. Miller, Ser. 4A4V5B-3, 1955

2½" National Upsetter, Ser. 16944, 1952

EMERMAN MACHINERY CORP.
875 WEST 120TH STREET, CHICAGO 43, ILLINOIS•PULLMAN 5-7626

SALE OF
U. S. AIR FORCE PROPERTY
BY SEALED BID

LOCATED AT
KAISER FLEETWINGS, INC.
BRISTOL, PENNSYLVANIA

Approximate Description of Material To Be Sold Is:

3 OVERHEAD CRANES
1 HEAT TREAT FURNACE
1 STAMPING HAMMER
1 DRILLING MACHINE
1 MILLING MACHINE
1 GRAFLEX CAMERA
5 IBM RECORDERS
4 COLD SPOT FREEZERS

FOR BID LETTER AND INSPECTION
CONTACT—WILLIAM C. HEILBRUN
KAISER FLEETWINGS, INC.
BRISTOL, PENNSYLVANIA
PHONE STillwell 8-8431 EXT. 179

BID OPENING—August 17, 1960 at 2:00 P.M.

UNIVERSAL Machinery & Equipment Co.

AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

ARC MELTING FURNACES
250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge—800 KVA
10′ Top Charge Arc Melting Furnace
12′ SWINDELL Top Charge—5000 KVA
DETROIT FURNACES—10 lb. to 3000 lb. Cap.

INDUCTION FURNACES
20 KW AJAX Spark Gap 17# Melting
30 KW VACUUM Melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel

WHEELABRATOR Sheet Cleaning Machine 48″ wide capacity

HEAT TREAT FURNACES
4′x4′x10′ Gas Fired Box
7′ G. E. Rotary Hearth Electric, 1900°F.
36″ dia. x 36″ deep Electric Recirculating
46″ wide Roller Hearth 50′L w/atmos. gen.
210 KW LINDBERG conveyor type. 1400°F.
10″x12″x24″ LINDBERG 2500°F. hydrogen

CLEANING EQUIPMENT AND GRINDERS
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
48x42 WHEELABRATOR w/loader
WHEELABRATOR No. 1-A Multi Table
48″ WHEELABRATOR Swing Table
72″ WHEELABRATOR Swing Table
96″ WHEELABRATOR Swing Table
6′ LK PANGBORN Table-room
PANGBORN Pipe Cleaner, 2″ to 14″ O.D.
SAFETY 10 H. Swing Grinder
WHITING 26″x54″ tumbling barrel

dust Collectors available for all machines

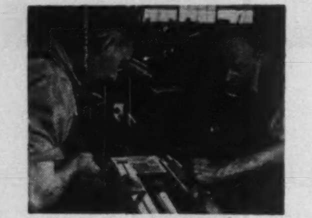
. . . SPECIAL . . .

15 Ton Double Leg A.C. Gantry Crane
50″ Magnet

Model 43 LIQUAMATTE wet blasting cabinet. Brand New. Ideal for finishing and cleaning tools, dies, molds, etc. at 50% SAVINGS.

1630 NORTH NINTH ST. READING, PA. PHONE FRANKLIN 3-5103

RE - BUILDING AT ITS BEST



Two of Miles 25 year men scraping in a grinder bed to new tool tolerances—one of the many operations which make Miles re-built tools perform like new.

Drill, No. 50½ Foote Burt hyd. fd. vert.
Groover, Wicaco cont. oil groover, new 53
Gear Checker, No. 20M Fellows Red Liner, 43
Gear Shaper, No. 7A Mod. 7125A Fellows, HS, Univ.
Gear Tester, No. 13 Gleason Univ.
Gear Shaver, Model GCC 8″ Red Ring
Grinder, Centerless, No. 2 Cincinnati Filmatic brg., late
Grinder, Cylindrical, 12″ x 48″ Cincinnati Univ. Filmatic, late
Grinder, Cylindrical, 22″ x 72″ Landis Univ.
Grinders, Disc. 24″ Mod. 221 Hanchett opposed wheel, dbl. disc.
Grinders, Internal, No. 72A3 Heald Gagematic
Grinders, Internal, No. 72A3 Heald Sizematic
Grinders, Internal, No. 72A5 Heald pl. univ.
Grinders, Internal, No. 24-36 Bryant hole
Grinders, Surface, 12″ x 12″ x 48″ Thompson type C, horiz.
Grinders, Surface, 20″ No. 25A Heald hyd. rotary
Grinders, Thread, No. 33 Ex-Cell-O automatic precision, rbt. in 53
Grinders, Thread, No. 35L Ex-Cell-O automatic
Hone, Model 224 Barnes vtl. int. hyd., 43
Lapper, No. 821-2 Micromatic, new 53
Lathe, Automatic No. 3D Gisholt simplimatic, platen, hard ways
Lathe, Engine 16″ x 58″ cc American Pacemaker, grd. hd. QCG
Lathe, Engine, 25″ x 72″ cc Axelson, Model E hy. dy., new 44
Lathe, Engine, 25″ x 18′ cc Axelson Model F hy. dy. hard ways, 44
Lathe Head, 90 swing Betts Bridgeford 30 HP M.D. 43
Lathe, Production, 15″ x 30″ cc Lipe Carbomatic, hyd. hy. dy., 42
Lathes, Turret, Model 1H6 Libby saddle type, hard ways, 42
Lathes, Turret, Model 2H8 Libby hy. dy. saddle type, hard ways
Lathes, Turret, 4L Gisholt hy. dy. saddle type, hard ways
Mills, Duplex, No. 5/48 Cincinnati hydramatic, bed type
Mills, Automatic No. 33 Sundstrand "Fluidscrew" Rigidmil
Mills, Boring, 5″ bar Sellers horiz. table type
Mills, Boring, 60″ Gisholt vert.
Mills, Planer Type, 42″ x 42″ x 18′ Ingersoll, adj. rail
Mills, Knee No. 5H K&T Milwaukee, plain. vtl. att. mt.
Mills, Rotary, 72″ Ingersoll 2 spdl. pointing, threading. Economy type R. Auto. new 48 (2)
Planer, 36″ x 36″ x 10′ Liberty dbl. hsg. adj. rail

Contract rebuilding of your used machinery

OVER 1,000 NEW AND USED MACHINE TOOLS IN STOCK
WRITE FOR LATEST STOCK LIST

MILES MACHINERY COMPANY
2041 EAST GENESEE • SAGINAW, MICH. PL. 2-3105

STAMPING & FORGING EQUIPT.
LATE MODELS—MDNA
MONEY BACK GUARANTEE

1300-Ton Nat'l. Maxipres, 80 SPM, 10″ Str., 1955
920-Ton Toledo #68, Bed 47x72, Str. 20″, 1943
700/390-Ton Toledo #797E, Bed 127x83, Dbl. Act. Toggle, Air Clutch & Cushion
600-Ton Ferracute E601, Coining, Str. 6″, 30 SPM, 1950
440-Ton Bliss #210, Bed 37x36, 35 SPM, Side Shear, Str. 16″, Mfg. 1953
440-Ton Toledo #59¼, Bed 41x48, Str. 12″
255-Ton Toledo #58½B, Bed 43x42, Str. 12″
150-Ton Cleve. 60-D-84, Bed 86x46, Str. 14″
3000# Chambersburg "Ceco Drop" Hammers, 1951

NEW RADIAL DRILLS
4½′x15″ MAS-VR4A #4MT, 2500 RPM, Preselection, Hyd. Clamping, program control.
12′x26″ MAS-VR103, #6MT, 9′ Vert. Cap 5″, Hole cap., 20 HP 1400 RPM

PRESSES WANTED
Phone or write Max Wender for top prices on your surplus stamping & forging equipment.

WENDER PRESSES Inc.
1957C Clay Detroit 11 Trinity 2-1270

COMPRESSORS
No better values at any price

100 CFM	100 psi	6 x 7 Ing. or Worth.
138 CFM	100 psi	7 x 7 Ing.—CPT—Worth.
142 CFM	125 psi	Ingersoll Rand Type 40-Jaeger
183 CFM	150 psi	7 x 7 Joy WG9
191 CFM	300 psi	9-4¼ x 9 ES-2
194 CFM	125 psi	7-7-6 x 5 Worth. M40
234 CFM	100 psi	9 x 9 Ing.—Worth. Chic Pneu
290 CFM	75 psi	10 x 9 Ing. ES-1
364 CFM	100 psi	10 x 9 Joy WG9
465 CFM	100 psi	12 x 11 IR—Amer.
502 CFM	125 psi	12 x 13 Ing. Rand.
585 CFM	100 psi	15-9¼ x 12 Ing.
660 CFM	125 psi	11½ x 7 x 7 Joy WN 102
676 CFM	100 psi	15-9¼ x 12 Ing. XRB
686 CFM	100 psi	14 x 13 IR—CPT
877 CFM	125 psi	17/10½ x 14—IR—XRB
1670 CFM	100 psi	C300-300H Fuller Rotary 300 hp West. Syn. 3-60-440, 80% PF
1721 CFM	100 psi	23-14x16 Ing. PRE-2 285 hp. GE-TS Syn. Motor 3/60/2300 See it running. $3700.00

Portable Gas-diesel 60″-600′

AMERICAN AIR COMPRESSOR CORP.
DELL AND IRON STREETS
NORTH BERGEN, N. J.
Telephone UNion 5-4848

PLANT DISMANTLING & LIQUIDATION
Surplus Equipment & Inventories Purchased
CURRY & HUDSON ASSOCIATES, INC.
Gateway Center, Pittsburgh 22, Pennsylvania

Keep 'em rolling . . . not rusting

FOR SALE
10—70-ton Hopper Cars, reconditioned
2—Whitcomb 20-ton Locomotives
10—40′ Flat Cars

MARSHALL RAILWAY EQUIPMENT CORPORATION
328 Connell Building, Scranton 3, Pennsylvania
Diamond 3-1117 Cable MARAILQUIP

IMMEDIATELY AVAILABLE
Because of Mill Consolidation
3 LEE WILSON RECTANGULAR BELL-TYPE ANNEALING FURNACES

atmosphere-controlled with 9 bases, are available. Each is approximately 7′ x 7′ x 14′. Excellent when used for manufacture of steel coils, they have a capacity of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.

NATIONAL MACHINERY EXCHANGE
126 Mott St. New York 13, N. Y.
CAnal 6-2470

FOR SALE
125 ton 8 wheel Niles overhead traveling crane, 77 ft. 5½ inch span, equipped with new surplus P & H 125 ton trolley hoist, weather proof cab, full magnetic mill type Cutler Hammer controllers. Hoist 60 H.P. Bridge 60 H.P. Trolley 15 H.P. Lift 40 ft. 220-440-60 cycle.

Crane Hoist Engineering Corp.
6515 Salt Lake Avenue
Bell, California

GET CASH NOW
for your new surplus motors, controls and transformers!

AVAILABLE: NEW MOTORS
Over 5,000 new motors in stock from [illegible]HP to 200 HP. Special low prices

Write, wire or phone collect!

AJAX ELECTRIC MOTOR CORP.
P.O. Box 262 Rochester, N.Y.
[illegible] Distance Phone [illegible]

RAILWAY EQUIPMENT

USED and RECONDITIONED

RAILWAY CARS and REPAIR PARTS

FLAT CARS

4—50-Ton Capacity, 43' long

Steel Underframe

DIESEL-ELECTRIC LOCOMOTIVES

1, G. E. 25-Ton, 150 H.P., Std. Ga.

3, G. E. 44-Ton, 400 H.P., Std. Ga.

1, G. E. 80-Ton, 500 H.P., Std. Ga.

1, BALDWIN, 120-Ton, 1000 H.P., Std. Ga.

IRON & STEEL PRODUCTS, INC.

13496 S. Brainard Ave.
Chicago 33, Ill.
Ph. Mitchell 6-1212

51-B E. 42nd St.
New York 17, N. Y.
Ph. YUkon 6-4766

FOR SALE OR RENT

1500 HP Alco Diesel Electric Switcher Locomotives. New 1949. Excellent Condition. 7 Available.

44 Ton Gen. Elec. Diesel Elec. Loco. Cummins 190 HP Engine. 4 Traction Motors. Rebuilt.

25 Ton Gen. Elec. Diesel Elec. Loco. New 1942. Cummins Engine.

40 Ton Ind. Brownhoist Diesel Loco. Crane. New 1946. Caterpillar Eng.

25 Ton Ind. Brownhoist #5 Diesel Loco. Crane. New 1941. Cat. Eng. Recond.

60 Ton Link-Belt K-595 Lifting Crane. 120' Boom. Cat D-17000 Diesel.

WHISLER EQUIPMENT CO.

1910 Railway Exchange Bldg., St. Louis 1, Mo.
CHestnut 1-4474

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

TYPICAL FOR MILL & REEL DRIVES

(2)—3500/3000-KW Al Chal. 5-unit Sets. (2) 1750-KW, Gen. 350/300—700/600-V.D.C., (1) 5000-HP Syn. Motor 13800/6900/4160-V., 3 ph., 60 cy., with exciters.

(1)—1325-KW Whse. 2-unit Set. Gen 600-V.D.C., with 2250-HP Syn. Motor 2300-V., 3 ph., 60 cy.

(1)—1520-KW 3-unit Set. (2) 760-KW Gen., 600-V.D.C., (1)—2250-HP Syn. Motor, 2300-V., 3 ph., 60 cy.

(1)—200-KW General Electric 3-unit Set, (2) 100-KW Gen. 250-V.D.C., with 300 HY Syn. Motor, 2300-V.D.C., 3 ph., 60 cy.

We can supply various Motors with these Sets, together with exciters and controls as a COMPLETE PACKAGE.

DIRECT CURRENT MOTORS
Adjustable and Constant Speed
(Suitable for MILL and STANDARD DUTY)

Qu.	HP	Make	Volts	R.P.M.
1	3000	G.E.	600	90/180
2—N-*	3000	Whse.	600	600
2—N-*	2700	G.E.	415	280
1—N-*	2500	Whse.	700	108/162
1—N-*	2200	Whse.	600	92/132
2—N-*	2000	G.E.	350	230/350
2—N-*	1750	G.E.	600	200/300
1— *	1500	Al.Chal.	600	120/240
3—N-*	1500	Whse.	600	300/700
2—N-*	1400	G.E.	250	165/300
6—N-*	750	Whse.	250	300/700
1	750	Whse.	250	200/400
2— *	650	S.&S.	300	1000/1350
2	600	Al.Chal.	600	300/600
1	600	Whse.	250	110/220
2	300	Whse.	230	300/600
2	235	Whse.	230	325/975
1	150	Whse.	230	400/1200
1	125	Whse.	230	450/1050
3	125	Whse.	230	350/1125
1—N-*	100	Whse.	250	350/700

N—New and unused.

T. B. MAC CABE COMPANY

4302 Clarissa St., Philadelphia 40, Penna.

Cable Address
"Macsteel" Philadelphia, Pa.

Phone
Davenport 4-8300

For Sale

SHEET METAL

STORAGE SYSTEM

Will handle Sheet Steel, Aluminum, etc., in sizes from 2'x8' to 4'x12'.

Consists of 205 individual sections built of steel with plywood lining. Arranged for ideal edge type finish protected storage of sheets permitting fast handling and instant access to any type desired.

Individual sections can be lifted in and out of storage with ease.

This Equipment Is in Like-New Condition and May Be Inspected in Chicago

Will Sell All Or Any Part At Fraction of Original Cost

For Inspection Call:
Chicago PR 6-4616

Industrial Enterprises

650 S. Second St., Louisville 2, Ky.
JO 3-1220

R. R.

EQUIPMENT

HOPPER TANK CABOOSES
FLATS GONDOLAS BOXES
AND SPECIAL DESIGNS

•

WE WILL REBUILD
TO YOUR SPECIFICATIONS
OR BUILD NEW
AS REQUIRED

•

RAIL & INDUSTRIAL
EQUIPMENT CO., Inc.
30 CHURCH STREET
NEW YORK 7, N. Y.
PLANT: LANDISVILLE, PA.

STA-FAST STEEL WEDGES

sharp edges give holding power like a screw.

Self-Aligning Steel Belt Fasteners.

Standard Steel Rivets used with Self-Aligning Fasteners.

STAMPINGS PUNCHINGS WASHERS

to your specifications

Catalog sent upon request

SALING MANUFACTURING COMPANY
Standard-Belt-Fastener Division
UNIONVILLE, CONNECTICUT

WANTED

2 or more No. 57 Toledo Trimming Presses with side shears, or similar machines

#0 and #10 Waterbury Farrel Inclined Automatic Thread Rollers

Donahue Steel Products Company
1919 W. 74th St., Chicago 36, Ill.

---

eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

BALL BEARING DRILLS

2 spindle No. 2 Footburt Sipp Sensitive H.S., m.d.
2 spindle Leland & Gifford H.S. Hydraulic Type, m.d.
2 spindle No. 2LMS Leland & Gifford, hydraulic step by step H.S., m.d.
3 spindle No. 2B-8" Edlund, m.d., H.S.
3 spindle No. 2MA6 Avey, H.S., m.d.
3 spindle Leland-Gifford #1LMS—H.S., m.d., late
3 spindle Leland-Gifford H.S., m.d.
4 spindle Leland-Gifford, m.d., on each spindle
4 spindle No. 15 Buffalo Bench Type
4 spindle Allen H.S., belt drive
4 spindle No. ½ MA8 Avey, m.d., H.D.
4 spindle Demco H.S., individual, m.d.
4 spindle No. 2MS Edlund, m.d.
4 spindle No. 2BMA6 Avey H.S., m.d..
6 spindle Allen H.S., belt drive
6 spindle Allen H.S., 7" overhand
6 spindle Leland-Gifford m.d. on each spindle, No. 2 Taper
6 spindle No. 1 Avey High Speed, m.d.
6 spindle No. ½ Avey MA8, m.d., H.S.

HORIZONTAL DRILLS

2 spindle No. 410 W. F. & John Barnes, m.d.
No. 410 W. F. & John Barnes, horizontal Boring & Drilling Machine, m.d.
No. 410 Barnes Single Spindle Deep Hole, m.d.
No. 2 Avey Style MA1, with horizontal operation
No. ½Bx50" Pratt & Whitney Gun Barrel Rifling, Model M1821, m.d., latest
No. 1½" x 105" Pratt & Whitney, 2 spindle Hydraulic Deep Hole Drill, Model 973, m.d., latest
No. 1½" x 105" Pratt & Whitney, Model M1825, 2 spindle Gun Barrel Rifling, m.d.
No. 1 Model M509 Pratt & Whitney, 2 spindle Deep Hole Drill, belted m. d.
¾" x 40" Bausch Double Horizontal Drilling Machine, m.d.
No. 445 W. F. & John Barnes Independent 2 spindle Deep Hole Drill & Boring Machine, late
No. 2F1 Natco Horizontal Boring & Drilling Machine
Natco, Holesteel Model, m.d.
Natco Horizontal Drill, 2 opposed B4F2 Head, 1943
No. 2 LeBlond Deep Hole Borer, m.d., 1943

MULTIPLE SPINDLE DRILLS

2 spindle No. 201¼ Barnes, m.d., H. D.
2 spindle No. 6 Colburn Manufacturing Type H.D., separate m.d. to ea. spindle

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times

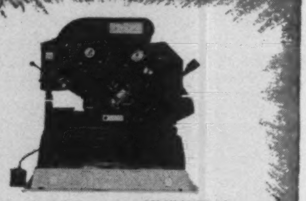
THE EASTERN MACHINERY COMPANY

1002 Tennessee Avenue, Cincinnati 29, Ohio

MElrose 1-1241

CABLE ADDRESS—EMCO

HIGHER CAPACITY
MODERN DESIGN
LOWER PRICE



WITH THE **MUBEA** UNIVERSAL IRONWORKER

Sizes Jr., #0, #½, #1½, #2½
Immediate delivery in your area
Write for brochure and nearest dealer

EHG
E·G·HELLER'S SON INC.
RA 3-8821 7039 E. SLAUSON, L.A. 22, CALIF.

PRESSES
BRAKES SHEARS

Will Lease or Furnish Long Terms

JOSEPH HYMAN & SONS
2600 E. Tioga St., Philadelphia 34, Pa

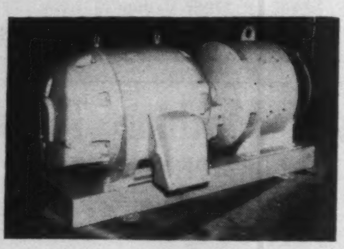
LIFTING MAGNETS

A complete magnet service. Magnets, new & rebuilt, generators, controllers, reels, etc.

Magnet specialists since 1910

Goodman Electric Machinery Co.
1060 Broad St. Newark 2, N. J.

M-G SETS from . . . . JEC



150 KW GENERAL ELECTRIC

IN STOCK—REBUILT & GUARANTEED

QY	KW	MAKE	SPEED	DC	AC
*‡ 1	750	Whse.	900	250	2300
‡ 1	600	Whse.	900	250	4160
1	500	G. E.	600	600	2300
1	360	G. E.	1200	250	440
1	300	Whse.	1200	250	2200
4	250	G. E.	1200	250	460
1	150	G. E.	1800	250	440
12	60	G. E.	1200	250	440
8	50	G. E.	1200	250	440

Write for complete Stock Book

JOLIET EQUIPMENT CORP.
GROSS ST., BOX 1078-A
JOLIET, ILLINOIS

Phones: Joliet SA 6-1922
Chicago BI 2-2458

* FOR MILL SERVICE—POLE FACE WINDING
‡ SPARE DC ARMATURE

CRANES
BOUGHT & SOLD

ENGINEERED TO YOUR REQUIREMENTS

Ornitz Equipment Corp.
Industrial Engineering Service
595 Bergen St. Brooklyn 38, N. Y.
NEvins 8-3566

AMERICA'S
CRANE REBUILDING SERVICE
LARGEST

- ANY CRANE CAN BE MODERNIZED TO THE MOST EXACTING SPECIFICATIONS
- MECHANICAL & ELECTRICAL RECONDITIONING
- BRIDGE SPANS & HEADROOM ALTERED
- OVER 100 USED CRANES AVAILABLE
- MANUFACTURERS OF SilenTorque CRANES

POLLOCK INDUSTRIES, INC.
SOUTH KEIM STREET, POTTSTOWN, PA. FAculty 3-5500

Lou F. Kinderman

P. O. Box 182, Niles, Ohio OLympic 2-9876

FOR SALE

1—7 Stand Bar & Rod Rolling Mill, 1 stand 3 high 15", 4 stands of 10" 3 high, and 2 stands of 10", 2 high complete with drives and accessories.
2—15 Ton Alliance O.E.T. Soaking Pit Cranes, 86' span, 230 volt DC.
1—125 Ton Morgan Ladle O.E.T. Crane, 85' span, 4 girder, 230 volt DC.
1—20 Ton P & H O.E.T. Crane, 54' span, 230 volt DC, mill type.
1—Decoiling and Shearing Line including leveler, tables, shear, gauge table capacity 14 gauge x 66" width.

HENRY & WRIGHT 150 TON CAP.

DIEING PRESS 3" Stroke 1947
Dble. Roll Feed; Scrap Cutter
30 HP 220/3/60 Varidrive Motor
Available: 50 Ton H & W and
25 Ton H & W

Seaboard Steel Co., Inc.
UN 5-0929 New Haven, Ct.

OFFERING
BRIDGE CRANES
ARNOLD HUGHES COMPANY
2765 PENOBSCOT BLDG. DETROIT, MICH
WOodward 1-1894

MOTORS • GENERATORS
TRANSFORMERS
NEW • REBUILT

ELECTRIC EQUIPMENT CO.

WORLD'S LARGEST INVENTORY
CALL COLLECT GL 3-6783
P O BOX 51 • ROCHESTER 1, N Y

FOR SALE

Ohio 35 Ton Model G
Locomotive Crane
Complete with 50' Boom, Magnet
and Generator
First Class Condition

$15,000 f.o.b. New York State

Phone Wire Write

HYMAN-MICHAELS COMPANY
108 N. State Street Chicago 2, Illinois
Dearborn 2-5422

Faster From Foster

Nation's Largest Warehouse Stocks
RAIL AND TRACK MATERIAL
PIPE, VALVES, FITTINGS

L. B. FOSTER CO.
Pittsburgh 30 · New York 7 · Chicago 4 · Houston 2
Los Angeles 5 · Atlanta 8 · Cleveland 35

RENT
(WITH OPTION TO BUY)
NEW "CINCINNATI" SHEARS

MACHINERY LEASING CORP.
2600 E. Tioga St. Phila. 34, Pa.
GArfield 6-5025

FOR SALE

COMPLETE BAR JOIST LINE INCLUDING ENGINEERING

Sizes—8" to 16" up to 32'-0 long
Machinery and method suitable for the small manufacturer. A 14 item inventory will make all sizes. Joists meet Bar Joist Institute requirements. Highest quality joists—acceptable everywhere. Machinery still energized—will demonstrate.

HATFIELD INDUSTRIES, INC.
Hatfield, Penna.—ULysses 5-2181

AGE 73 AND GLAUCOMA

are forcing me to sell my developments. You should own a tool room and metal stamping presses. A resume will be mailed. Brokers protected.

HK9-623 Fullerton Pkwy.
Chicago 14, Ill.

SALE 6,000 LB. RENT
CECO DROP

Forging Hammer. Serial #1703L5. Mfg. 1955. Inserted Guides. Less than 3 months use. **Guaranteed Equal To New.** Dismantled—Ready To Load—$35,000.

ERIE EQUIPT. CO.
TE 4-1894, 4700 Burlingame, Detroit 4

HYDROGEN PLANT

Knowles Hydrogen Producing Plant—10,000 cu. ft. per hr. hydrogen—5,000 cu. ft. per hr. oxygen—complete—dismantled—ready for re-installation.

BOX H-90
c/o The IRON AGE, Chestnut at 56th, Phila. 39

ADVERTISERS IN THIS ISSUE

An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

A

*Advance Glove Mfg. Co........ 262
Aetna-Standard, Div. of Blaw-Knox Co. 228
Ajax Electric Motor Corp......... 346
Ajax-Magnethermic Corp. 60
Alan Wood Steel Co............. 326
*Allegheny Ludlum Steel Corp.... 4
Aluminum Co. of America......50-51
American Air Compressor Corp. 346
American Brass Co. 111
American Chain & Cable Co. Inc., Wright Hoist Div......... 49
American Chain & Cable Co., Inc., Allison-Campbell Div...... 48
American Gas Furnace Co....... 208
*American Pulverizer Co. 233
American Smelting & Refining Co. Continuous-Cast Products Department 113
American Society of Tool Engineers 342
*Amplex Division Chrysler Corp..46-47
*Arcos Corp. 240-241
Armco Steel Corp. 6
Armstrong-Blum Manufacturing Co. 114-115
*Armstrong Bros. Tool Co........ 249

B

*Baldwin-Lima-Hamilton Corp. Industrial Equipment Div. 138
Barber-Colman Co. 26-27
*Bausch & Lomb, Inc.............. 16
Bayonne Bolt & Nut Corp........ 262
Bay State Abrasive Products Co. 136-137
*Behr Manning Co. 246-248
Belyea Co., Inc. 344
Bertsch & Co. 28
Bethlehem Steel Co. 1, 291
*Bishop, J., & Co................. 99
Birdsboro Corp. 112
Blaw-Knox, Aetna-Standard Div... 228
*Bliss, E. W., Co., Rolling Mill Div. 190-191
Boston Gear Works 58
Bristol Brass Corp................ 335
Brown & Sharpe Mfg. Co. Machine Tool Div. 39-45
*Buffalo Forge Co. 281-284
*Burg Tool Manufacturing Co., Inc. 126-127

C

Calumet Iron & Supply Co........ 349
Canton Drop Forging & Mfg. Co. 252
Carpenter Steel Co. 307
*Chambersburg Engineering Co... 56
Chicago Bridge & Iron Co....... 252
*Chicago Pneumatic Tool Co....88-89
*Chicago Tramrail Corp. 266
Cincinnati Shaper Co. 94-95
*Cleveland Crane & Engineering Co., Steelweld Machinery Div.. 130
*Cleveland Punch & Shear Works Co. 35
Columbia-Geneva Steel Div., United States Steel Corp. 124-125
Columbia Tool Steel Co......... 293
*Commercial Shearing & Stamping Co. 12
Cone Automatic Mch. Co., Inc. 234-235
Consumers Steel & Supply Co..... 349
*Continental Steel Corp. 254
Continuous-Cast Products Dept. American Smelting & Refining Co. 113
Cooper-Bessemer Corp. 256-257
*Copperweld Steel Co. Aristoloy Steel Div. Inside Front Cover
Copperweld Steel Co., Ohio Seamless Tube Div. 219
Cosa Corp. 62
Crane Hoist Engineering Corp... 346
*Crucible Steel Co. of America 20, 96-97, 320-321
Curry & Hudson Associates, Inc... 346

D

*Danly Machine Specialties, Inc. 129
*DeLaval Steam Turbine Co.....36-37
Denison Engineering Div. American Brake Shoe Co... ... 157
Detecto Scales, Inc. 261
De Vlieg Machine Co. 64-65
*Diamond Manufacturing Co.... 331
Diamond Power Specialty Corp... 38
Donahue Steel Products, Inc. ... 347
Dreis & Krump Mfg. Co.......... 255
*Drop Forging Assoc. 165
*Du Mont Corp. 309
*Dykem Co. 252

EMPLOYMENT EXCHANGE

Help Wanted

WANTED

General Superintendent—For malleable iron foundry. Applicant must have had experience in production shop. Metallurgical background desirable. Please state age and experience in reply. Must be familiar with malleable iron gating, molding technique, etc.

BOX H-89
c/o The IRON AGE, Chestnut at 56th, Phila. 39

REFRACTORY METALS

Sales Engineer in newly developing electron beam refractory metals field. Location in San Francisco Bay Area. College education with experience in refractory metals industry desired. Write Personnel Manager:

Stauffer-Temescal Company
1375 So. 47th Street, Richmond, California

Accounts Wanted

Manufacturer's agent with following wants to represent a Flat Die Forging Company. Prefer a territory Eastern Pennsylvania and Western New Jersey area. Box H-91, care The Iron Age, Chestnut at 56th, Phila. 39.

EQUIPMENT AND MATERIALS WANTED

WANT BRAKE & SHEAR

Need used 8-ft. press brake, 75-100 ton; 12-ft. shear, 10 ga. steel.

The Marley Co., Kansas City 14, Mo.

LARGEST BUYERS
in any quantities
OF SURPLUS—NEW & USED
Structurals—All Types of Steel
Pipe—Tubing—Tanks—Boilers
CALUMET IRON & SUPPLY CO.
[illegible]

WANTED TO PURCHASE—any quantity
CARBON—ALLOY—STAINLESS
Bars—Billets—Sheet—Plate
THE GILBERT MERRILL STEEL CORP.
91 New York Ave., Westbury, L. I., N. Y.
EDgewood 3-7300

SURPLUS STEEL
NEW *WANTED* **USED**
Structurals, Plate, Pipe and Tubing
Consumers Steel & Supply Co.
P. O. Box 270, RACINE, WISCONSIN

WANTED
BRIDGE CRANES
ARNOLD HUGHES COMPANY
2765 PENOBSCOT BLDG. DETROIT, MICH.
WOodward 1-1894

WANTED
SURPLUS STEEL
WALLACK BROTHERS
7400 S. Damen Ave. Chicago 36, Illinois
GROVEHILL 6-7474

WEISS STEEL CO. INC.
600 WEST JACKSON BLVD.
CHICAGO 6, ILLINOIS
Buyers of Surplus Steel Inventory
39 Years of Steel Service

ADVERTISERS IN THIS ISSUE

An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

E

Eastern Machinery Co. 347
Electric Equipment Co......... .. 348
Emerman Machinery Corp....... 345
Erie Equipment Co. 348
Erie Foundry Co. 78

F

Fate-Root-Heath Co. 71
Federal-Mogul Service Div. of Federal-Mogul-Bower Bearings Inc. 230
*Feller Engineering Co. 148
Fenway Mch. Co., Inc........... 299
Ferry Cap & Set Screw Co....... 68
Finkl, A., & Sons Co.............. 245
Firth Sterling, Inc. 297
Foote Bros. Gear & Machine Corp. 52-53
Foster, L. B. 348

G

Gardner Machine Co. 18-19
*General Electric Co. 139-142, 264-265
*General Electric Co., Specialty Control Dept. 92-93
Gilbert Merrill Steel Corp....... 349
Gisholt Machine Co.............. 263
Goodman Electric Machinery Co.. 348
Goodyear Tire & Rubber Co. Industrial Products Div. 10
Goss & DeLeeuw Machine Co..... 98
Grant Gear Works, Inc.......... 192
Gray, G. A., Co. 132-133
Great Lakes Founders & Mch. Corp. 342
Gulf Oil Corp. 305

H

*Hamilton Foundry, Inc. 177
Hatfield Industries, Inc. 348
*Hayes, C. I., Inc. 13
Heller's Sons, E. G., Inc......... 348
Hughes, Arnold, Co..........348, 349
Hyatt Bearings Div. General Motors Corp. 189
Hyde Park Foundry & Machine Co. 216
Hydraulic Press Mfg. Co.......116-117
Hyman, Joseph & Sons........... 348

I

*Imperial Electric Co. 250
Industrial Distributors (Sales) Ltd. 72-73
Industrial Enterprises 347
*Industrial Equipment Div., Baldwin-Lima-Hamilton Corp... 138
Inland Steel Co. 59
Innocenti Corp. 17
Iron & Steel Products, Inc........ 347

J

Joliet Equipment Corp. 348
*Jones & Lamson Machine Co. 167, 169, 171, 173

K

Kaiser Engineers 724
Kaiser Fleetwings, Inc. 346
Keokuk Electro-Metals Co. 251
Keuffel & Esser Co. 176
Keystone Steel & Wire Co....... 179
Kidde, Walter & Co., Inc......... 15
Kinderman, Lou. F. 348
Kingsbury Machine Tool Corp... 223
*Kinnear Manufacturing Co...... 227

L

Lake Erie Engineering Corp..... 258
Landis Machine Co. 82-83
Latrobe Steel Co. 311
LeBlond, R. K., Machine Tool Co. 107-109
Leeds & Northrup Co. 118
Lees-Bradner Co. 102
*Linde Co., Div. Union Carbide Corp. 84-85
Lodge & Shipley Co. 143

M

*Maas & Waldstein Co. 79
MacCabe, T. B. Co............... 347
Mahon, R. C., Co. 128
Marley Co. 349
Marshall Railway Equip. Corp.. 346
Miles Machinery Co. 346
Miller Electric Mfg. Co., Inc.... 239
Milne, A., & Co., Inc............ 301
Minster Machine Co. 75
Mitsubishi Shipbuilding & Eng. Co., Ltd. 122-123
Monarch Machine Tool Co. 131
*Morgan Construction Co. 5
Morse Chain Co. 66

N

*National Automatic Tool Co. 144-145
*National Broach & Machine Co. 119
National Machinery Exchange.... 346
National Steel Corp. 14
National Tube Div., United States Steel Corp. 124-125
Nebel Mch. Tool Corp. 121
New Britain-Gridley Machine Div., New Britain Machine Co.....317-318
New Departure Div., General Motors Corp. 145
*New York & New Jersey Lubricant Co. 329
Niagara Machine & Tool Works 69-70
Nicholson File Co. 57
Norden Div. United Aircraft Corp. 22-23

O

*Ohio Ferro-Alloys Corp. 211
Ohio Seamless Tube Div. of Copperweld Steel Co. 219
*Orban, Kurt, Co., Inc........105-106
Ornitz Equipment Corp. 348

P

Parish Pressed Steel Div. Dana Corp. 74
Perkins, A. Byron, & Associates, Inc. 242
Pittsburgh Steel Co. 134-135
Plymouth Locomotive Works Div. Fate-Root-Heath Co. 71
Pollock Industries, Inc. 348
Porter, H. K., Co., Inc.........61, 313

R

*R-S Furnace Co., Inc. 11
Rail & Industrial Equip. Co., Inc 347
*Republic Steel Corp. 24-25
Research-Cottrell, Inc. 104
*Research, Inc. 178
Rhode Island Tool Co............ 329
Riverside-Alloy Metal Div. H. K. Porter Co., Inc.......... 61
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp..... 103
Rolled Alloys, Inc. 260
Ryerson, Jos. T. & Son, Inc....... 8

S

Salem-Brosius, Inc. 174
Saling Manufacturing Co. 347
Sandvik Steel, Inc. 303
Seaboard Steel Co., Inc.......... 348
*Sheffield Corp., Bendix Aviation Corp. 80-81
*Shenango Furnace Co. 243
Sidney Machine Tool Co..........76-77
Signode Steel Strapping Co. Back Cover
Snyder Corp. 158
Somers Brass Co., Inc............ 222
*Steelweld Div., Cleveland Crane & Engineering Co....... 130
Sun Oil Co. 86-87
Swift-Ohio Corp. 253
Synthane Corp. 120

T

*Thermal Research & Engineering Corp. 244
Timken Roller Bearing Co........ 160
Trabon Engineering Corp. Inside Back Cover
Treadwell Engineering Co........ 90
Trent Tube Co. Subsidiary Crucible Steel Co. of America.......... 20

U

*Udylite Corp. 236
*Union Carbide Corp. Linde Div. 84-85
United Aircraft Corp. 22-23
United Engineering & Foundry Co. 67
U. S. Electrical Motors, Inc..... 63
United States Rubber Co. Mechanical Goods Div. 220
United States Steel Corp. 29-34, 54, 124-125
United States Steel Export Co. 124-125
*Universal Atlas Cement Div.,
Universal-Cyclops Steel Corp..... 295
Universal Machinery & Equipment Co. 346

V

*Vascoloy-Ramet Corp. 91
Vulcan-Kidd Steel Div. H. K. Porter Co., Inc........... 313

W

Wales-Strippit Div. Houdaille Industries, Inc....... 180
Wallack Bros. 349
Ward Steel Co. 242
Waterbury-Farrel Foundry & Machine Co. Div. Textron, Inc..... 110
Wean Equipment Corp. 162
Weirton Steel Co. 14
Weiss Steel Co., Inc.............. 349
Wender Presses, Inc. 346
*Westinghouse Electric Corp. 100-101
*Wheelabrator Corp. 261
Wheelock, Lovejoy & Co., Inc.... 298
Wheland Co. 252
Whisler Equipment Co. 347
Whitney, W. A., Mfg. Co......... 242
Wiedemann Mch. Co. 206-207
*Williams-White & Co. 212
*Wing Mfg. Co., L. J............ 55

Y

*Yoder Co. 21

CLASSIFIED SECTION

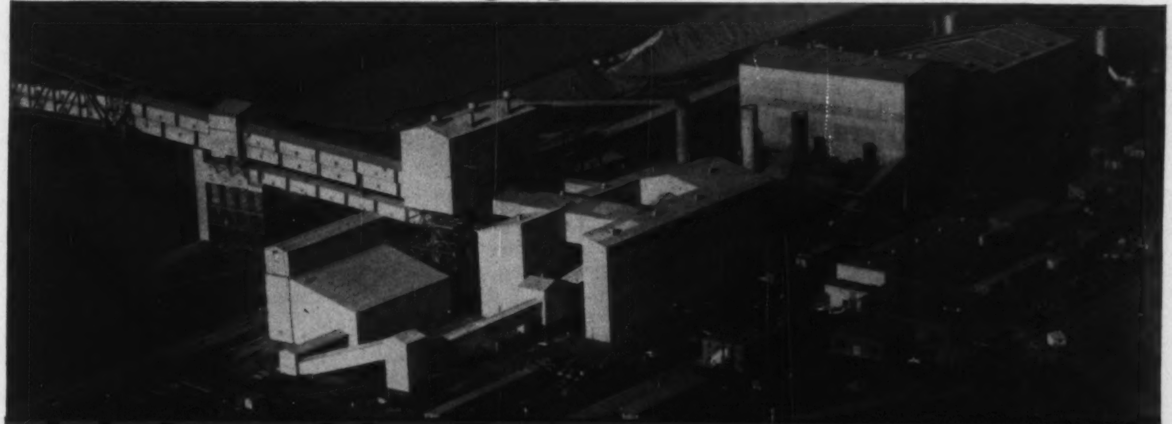
Clearing House 344-348
Equipment & Materials Wanted.. 349

TRABON®

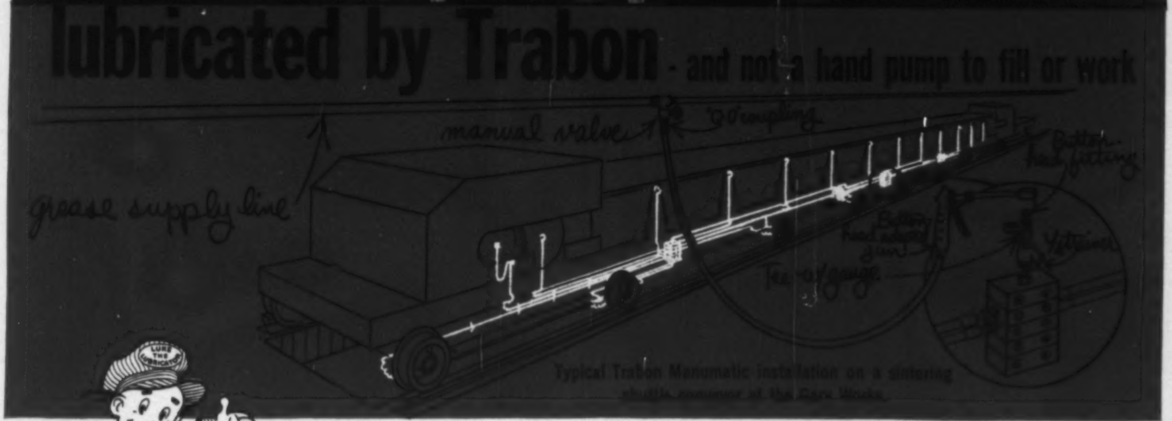
CENTRALIZED LUBRICATING SYSTEMS

21,591 bearings at the new Gary Sintering plant...

Trabon Manumatic Systems were selected by U.S. Steel to provide the simplest, most positive means of lubricating a large number of bearings at their new Gary Sintering Plant. Nine automatic air-operated pumps supply grease under pressure to header lines, lubricating idler rolls, return idlers, take-ups, etc. To lubricate 50 or more bearings at any Manumatic station, the operator simply opens the valve for five or ten seconds. There are no hand pumps to work or fill—no tedious checking of individual valve indicators. And every Manumatic System has built-in central warning! Specify Trabon, the modern way to protect your machinery.



lubricated by Trabon - and not a hand pump to fill or work



Typical Trabon Manumatic installation on a sintering shuttle conveyor at the Gary Works.

"*Centralized*" OIL AND GREASE SYSTEMS "*Meterflo*" CIRCULATING OIL SYSTEMS
"*Meter-Mist*" OIL SYSTEMS

Trabon® **Trabon Engineering Corporation** 28815 Aurora Road • Solon, Ohio

Production line strapping of tin plate coils

Packaging of tin plate coils is now on a production line basis in speed and low cost. Fast, dependable Signode air power tools take ¾" and 1¼" steel strapping from the dispenser, eliminating the waste of cut-to-length strap. Overhead tool suspension systems and engineered dispensers add mobility and save more time and effort. Engineered installations by Signode save time and money. Write for more information. Ask for free copy of "Air Power Tensioners and Sealers."

First in steel strapping

SIGNODE STEEL STRAPPING CO.
2623 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto